Fifth Amended Application For An Individual Incidental Take Permit

Under The Endangered Species Act Of 1973

Submitted To:
Assistant Administrator for Fisheries
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Application Date:
January 18, 2001

Applicant:
Grants Pass Irrigation District

Grants Pass Irrigation District's Address:
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Grants Pass Irrigation District's Legal Description:

The Grants Pass Irrigation District was organized under the Oregon Revised Statutes Chapter 545 and 548, lawfully created by vote of the District residents on January 17, 1917, as filed and recorded on page 568, Volume 5, Commissioners Court Record of Josephine County, Oregon on January 29, 1917, to provide irrigation water to its patrons in Jackson and Josephine Counties.

The Affected ESA-Listed Species:

Coho Salmon (*Oncorhynchus kisutch*) of the Rogue River Basin, are listed by the NMFS

as a “threatened” species of the Evolutionary Significant Unit (ESU) within the Southern Oregon/Northern California (SONC) region (FR 60(142)). Chinook were proposed for listing as “threatened” on March 9, 1998 (FR 63(45):11481-11520), but a listing was determined not to be warranted on September 16, 1999 (FR 64(179):50394-415). Rogue River steelhead were also designated in March 1998 as a candidate species for ESA listing (FR 63(53):13347-13371), although a listing was not warranted; NMFS is currently under a court order to reconsider listing the steelhead. Additional information concerning the status, distribution, seasonal distribution, habitat needs, feeding habits and other biological requirements of the relevant species are attached in Appendix A, "Biological Appendix"

I. THE PROPOSED ACTION AND DIRECT IMPACTS TO SALMONID POPULATIONS IN THE ROGUE RIVER

A. Description Of The Proposed Activity

The proposed activity is the diversion of water from the Rogue River at Savage Rapids Dam into GPID’s distribution system for the 2001 irrigation season. This diversion of water is currently accomplished by a distribution system at Savage Rapids Dam. This water is used to irrigate approximately 7,500 acres of land. Diversion of water and its use for irrigation in this area has been occurring for nearly 70 years. GPID proposes to continue diverting water from the Rogue River through existing diversions at Savage Rapids Dam until construction of new intake pumps is completed on each shore of the river.

GPID’s actual water diversions have historically ranged between 150 and 180 cfs. With water conservation efforts diversions have been decreasing and GPID anticipates meeting the goal of consuming 149 cfs in the future. In 1982, as a result of a proof survey performed by the Oregon Water Resources Department (“OWRD”), GPID was issued a water right for 97 cfs. In 1987, GPID applied for a permit to use additional water. Under this permit, GPID has the right to divert an additional 52 cfs of water. The continuing vitality of this permit is the subject of litigation pending in the Oregon Court of Appeals. GPID generally begins diverting water in April, with water use increasing throughout the summer months of June, July and August. Historically, diversion rates begin to decline in September and the end of the irrigation season is in October.

The District is seeking to remove Savage Rapids Dam replace the existing diversion facilities with new, electrically-powered pumping plants. Dam removal and construction of new diversion points (hereafter, the "Dam Removal/Pumping Plan") is expected to proceed in accordance with federal legislation introduced on October 23, 2000, as S. 3227 (106th Congress, 2nd Session). The District is committed to continuing support of this legislation, and is advised that the State of Oregon and intervenors in *United States v. Grants Pass Irrigation District* also support the legislation. The District's Board has unanimously passed Resolution No. 00-10, approving S. 3227, and superceding its prior Resolution No. 99-02.

The District notes, however, that its continuing support of the legislation is contingent upon the State of Oregon's continuing willingness to permit the District to divert at least 149 cubic feet per second (cfs) of water in the future, and NMFS' grant of a satisfactory incidental take permit permitting continued irrigation diversions pending dam removal. The District is aware that Congressional support of the legislation also depends upon the State's cooperation in ensure full water availability for the District, and has been advised by the Governor's office that the State will support continuing full diversions at the dam so long as adequate legislative efforts are ongoing.

The District also recognizes that Congress may not authorize, and appropriate funds for, a Dam Removal/Pumping Plan that is exactly the same as S. 3227. Because of the wide range of possible outcomes, and the need to avoid prejudice or confusion with respect to its request for Congressional assistance, the District does not believe it is practicable or reasonable to set forth contingency plans in the event that Congressional action produces a different outcome. The District remains willing to enter into a comprehensive consent decree settling litigation over the Dam that would allow a third-party to establish the District's rights and obligations following Congressional action.

The Habitat Conservation Plan (HCP) boundaries include Savage Rapids Dam on the Rogue River at km 173, and the inundated area that extends upstream from the dam, the tailrace area within 0.5 km below the dam. Savage Rapids Dam and the associated facilities are described in detail in subsequent section of this HCP.

B. Conservation Plan Goals and Objectives

It is the District's short-term goal and objective to increase salmon and steelhead populations in the Rogue River Basin by providing fish passage facilities at Savage Rapids Dam that reduce to the maximum extent practicable adverse impacts on adult and juvenile salmonids passing the Dam.

It is the District's long-term goal and objective to increase salmon and steelhead populations in the Rogue River Basin by removal of impediments to juvenile adult fish passage presented by Savage Rapids Dam.

C. Anticipated Take Levels Resulting from Plan Activities

The activity of diverting water from the Rogue River at the Savage Rapids location will continue during future irrigation seasons pending dam removal consist with the terms of prior stipulations reached in *United States v. Grants Pass Irrigation* District, and as specifically described below. The modifications in operations and maintenance procedures of the GPID water diversion activity that have been implemented on a continuing basis in 1998, 1999, and 2000 will continue in future years to minimize salmonid impacts as described below, subject to *force majeure*.

1. Juvenile Salmonids: Interim Operations

Impacts that will occur to juvenile salmonids are based on the assumption that outmigrating fish will follow migration routes past Savage Rapids Dam in proportion to the flow going that route. Diagrams were developed to depict these passage routes and expected mortality rates for each route during high and low flow years (Figures 1 and 2). We chose the 20th percentile flows to represent low flow years and the 80th percentile flows to represent high flow years. We also chose May to represent outmigration of coho and steelhead and August to represent outmigration of chinook. The frequency with which various mean monthly flows have been observed at Grants Pass since completion of Lost Creek Dam (which substantially modified the flow regime) is shown in Table 1.

Table 1. Number of years in which various mean monthly flows have been observed at Grants Pass, 1978-1998.

Upper Limit	Frequency				
Flow (cfs)	May	June	July	August	September
500	0	0	0	0	0
1,000	0	0	0	0	0
1,500	0	0	2	0	4
2,000	3	4	4	9	9
2,500	2	6	11	9	6
3,000	4	4	2	1	1
3,500	1	3	1	1	0
4,000	1	1	1	0	0
4,500	3	0	0	0	0
5,000	2	3	0	0	0
>5,000	5	0	0	0	0
20 Percentile	2,296	2,085	1,847	1,914	1,507
80 Percentile	5,071	3,309	2,446	2,346	2,044

Total mortality to juvenile salmonids related to operation of Savage Rapids Dam is estimated based on the overlap in the time of their passage with the time of dam operations, and by the proportion of flow affected by the dam. Much of the spring and summer flow of the Rogue River is controlled by outflows from Lost Creek Dam (km 253). The diagrams in Figures 1 and 2 represent the range of high and low flows that are likely to occur during passage of juvenile salmonid when Savage Rapids Dam is operating to divert water. Flows through the north-side screens are assumed to be 800 cfs under all conditions.

In either the high or low flow situation, the addition of forebay lighting to attract fish over the spillway dramatically reduces the number of juveniles that are impacted by the dam. Replicated experiments during summer of 1998 demonstrated that fish use of the north-side bypass system dropped by 90% on nights when lighting over the spillway was turned on (Becklin *et al.* 1998). There was no increase in fish entrainment on those nights, so the fish must have passed over the spillways as intended. Use of the same floodlights has become standard operating procedure.

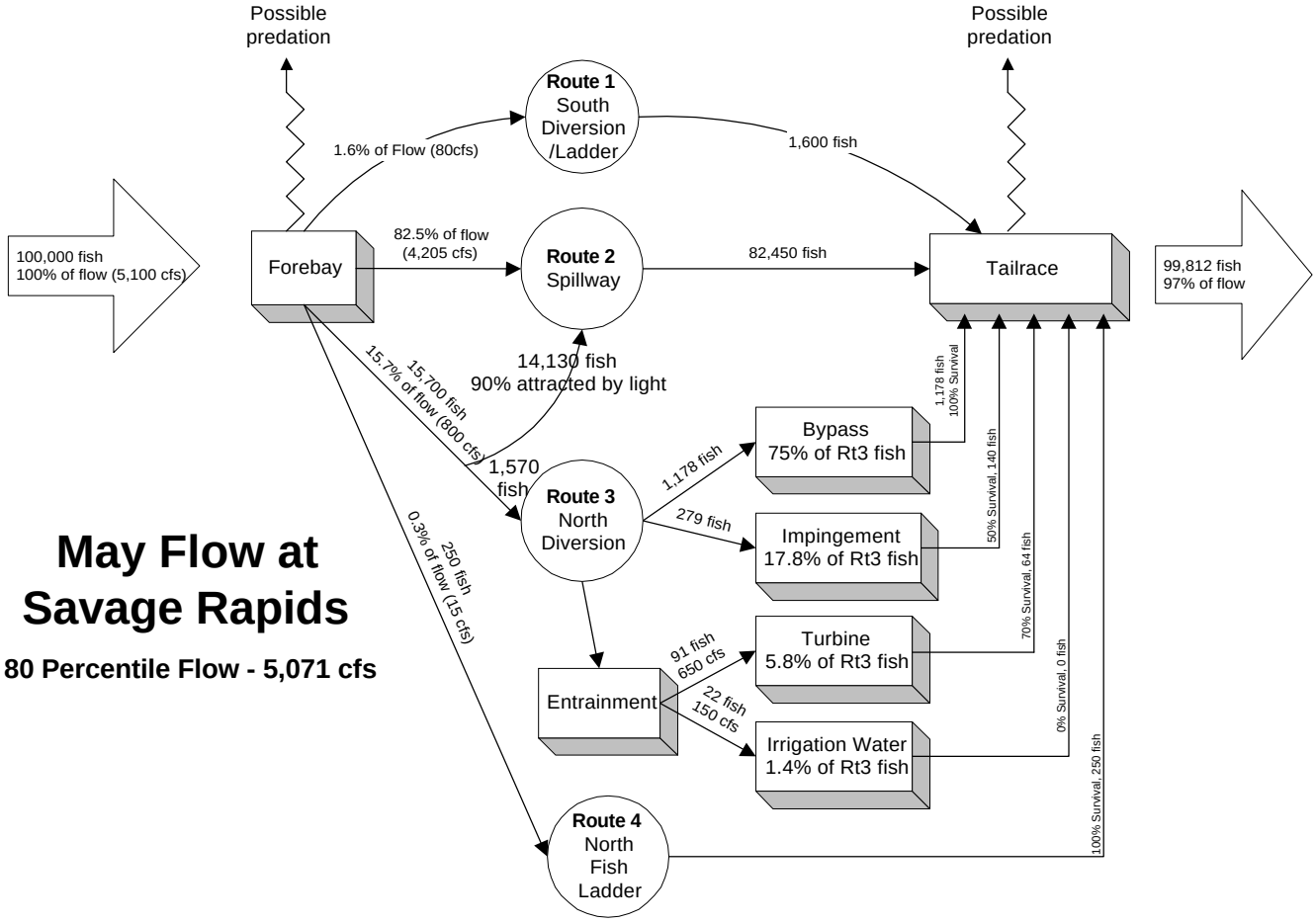

Figure 1. Diagram of the proportion of flow and fish that are predicted to follow the three main routes passing downstream over Savage Rapids Dam during an 80% percentile high flow in May. May is the peak migration month for juvenile coho and steelhead. Boxes represent locations where some mortality may occur. See text for assumptions.

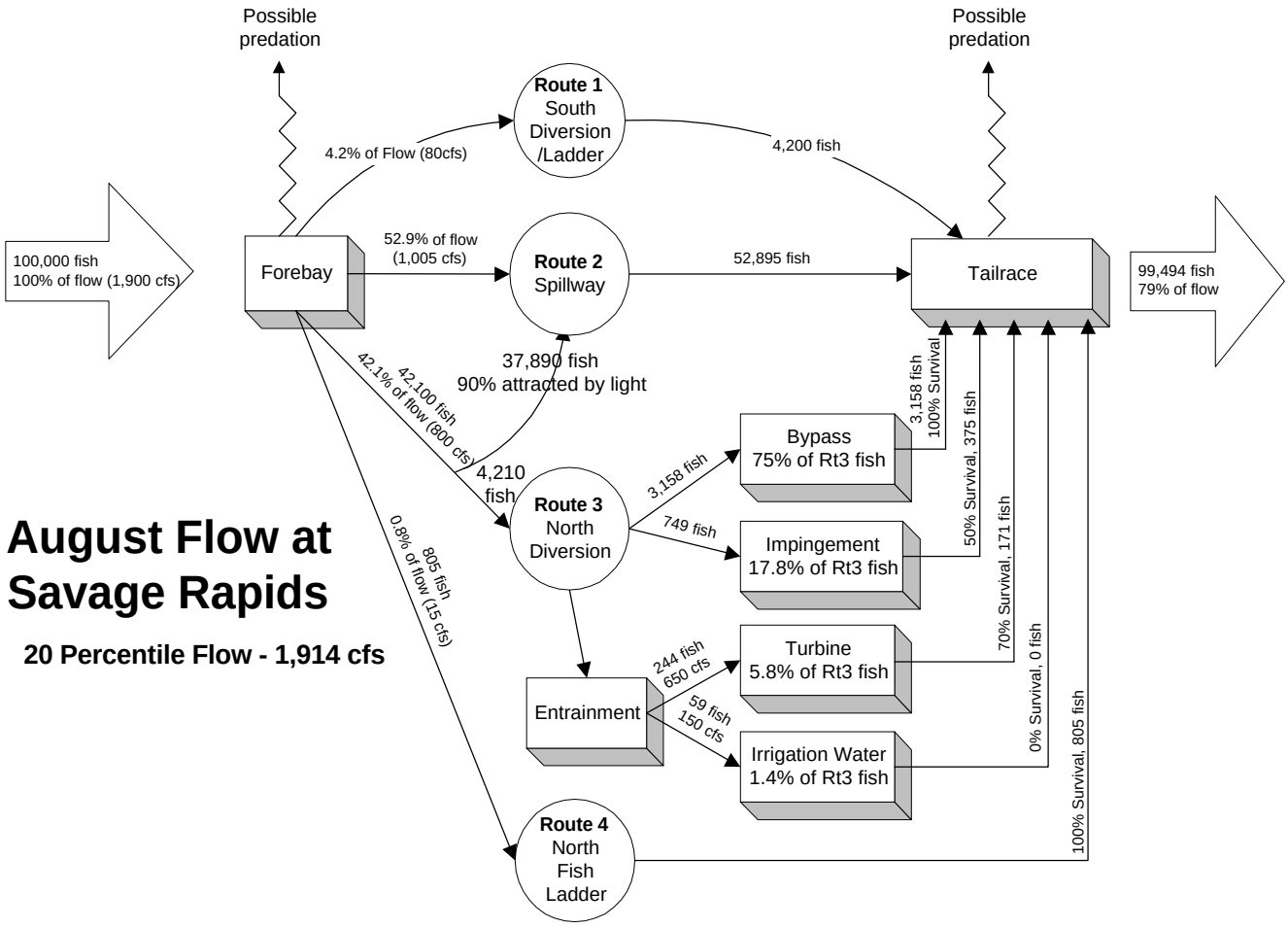

Figure 2. Diagram of the proportion of flow and fish that are predicted to follow the three main routes passing downstream over Savage Rapids Dam during an 20% percentile low flow in August. August is the peak migration month for juvenile chinook. Boxes represent locations where some mortality may occur. See text for assumptions.

Total mortality of juvenile fish passing the dam in May (high flow) or August (low flow) can be roughly estimated by following the diagrams in Figures 1 and 2. During the highest 20% of flow years in May, only 1.6% of fish (15.7% of flow) would even approach the north-side screens (Figure 1), but even during the lowest 20% of flow years in August, only 4.2% would approach the screens (Figure 2). Once fish approach the north-side screen we assume their pathways would divide between the bypass, impingement or entrainment in the same percentage that they did during sampling in 1998. In 1998, the average catches per day for all juvenile salmonids were 33.3 fish in the bypass, 7.9 fish on the traveling screens, and 0.6 fish entrained into the canals (Cramer and Pellissier 1998). As discussed in Cramer and Pellissier (1998), the data for age 0+ steelhead indicate that impingement rate was probably overestimated, but we used the average value (7.9 fish/day) anyway. We assume that the number of fish per cubic foot of water pumped into the Tokay and Highline canals was the same as the number of fish per cubic foot of that for water that passed through the turbines. Given that flow through the turbines (650 cfs) was 650cfs/150cfs = 4.33 times greater than into the canals (150 cfs), the daily number of fish passing through the turbines would be 4.33 x 0.6 fish/day = 2.6 fish/day. After summing the average number of fish per day through all north-side, non-spill passage routes, we can calculate that the juveniles that approach the north-side screens (1.6 - 4.2% of all fish) then split up as follows: 75% enter the bypass, 17.8% are impinged on the screens, 1.4% are entrained into the canals, and 5.8% pass through the turbines. Again, these are based on observed values in 1998 that were averaged for sampling from June 8 through August 11.

The estimated percentages of fish that follow various pathways, combined with further estimates of the mortality rate through each pathway, will produce total estimated impacts. We assume that 100% of fish entrained into the irrigation canals die, because they have no routes of return to the river. The turbines at Savage Rapids were not designed to be fish-friendly, so we assume they kill 30% of entrained fish that pass through them. We assume that half of impinged fish die, although roughly 85% were still alive when sampled in the screen backwash in 1998 (Cramer and Pellissier 1998). We assume there is no mortality through the fish bypass or over the spillway. The spilling of water onto rocky outcroppings in the tailrace has been corrected by blocking that portion of the spill (bay 7) with stoplogs, so that most fish pass over the spillway into a deep plunge pool where mortality should be rare.

There is extensive evidence in the Columbia Basin that juvenile salmonid passage over spillways is relatively benign. Mortality over spillways that has been estimated at other dams would most likely occur as a result of predation on disoriented fish; however, we have no basis for assuming a predation rate at Savage Rapids Dam. No estimates of mortality to predation have ever been made in the forebay and tailrace, nor are there any indications that such mortality is substantial. For example, seagulls do not congregate in the tailrace, even though they are common in the Grants Pass area. Spills at mainstem Columbia and Snake River dams are higher and more violent than spills at Savage Rapids Dam. Even though spill is relatively benign to fish passage on the Columbia River, large numbers of seagulls congregate in the tailrace of every active spillway on the Columbia

and Snake rivers to feed on juvenile salmonids that are brought to the surface. Further, large concentrations of squawfish can be seen preying on salmon smolts at the upstream face of Columbia River dams. In contrast, biologists retained by the District have never seen a congregation of seagulls below Savage Rapids, nor a school of predatory fish in the forebay or tailrace. Longtime ODFW biologists on the Rogue River, Tom Satterthwaite and Mike Evenson similarly report that they see no consistent indications of high predator activity near Savage Rapids Dam. Viewers of Figures 1 and 2 can easily determine the effect of any predation they wish to assume by simply multiplying their rate by the numbers of fish in the forebay or in the tailrace.

The net result of juvenile passage through all passage routes at Savage Rapids Dam, as displayed in Figures 1 and 2, is that even with the lowest 20% flows observed in August, 99.5% of juveniles arrive alive in the tailrace. This number would be reduced by the percentage mortality from predation that anyone wishes to assume in the forebay or tailrace. Even if mortality was 100% for all fish that were impinged or passed through the turbines, the overall survival to the tailrace would still be 99.0% of fish approaching the dam under a low flow condition. This outcome is quite different than what would have been estimated prior to the interim improvements in fish passage operations. The most dramatic reduction in past mortalities resulted from the attraction of 90% of north-side fish away from the screens and over the spillway. Additional benefit to survival was achieved by eliminating spill onto the rocky outcroppings below the dam.

2. Adult Coho: Interim Operations

The only observed mortality to adult coho passing Savage Rapids Dam has been from fish that jumped or swam out of the fishway. ODFW (1991) reported the following about prespawning mortality of adult coho observed during 12 years of study: "Survey crews found three unspawned carcasses near Agness during 1980 and four carcasses outside of the fish ladders at Savage Rapids Dam during 1984. The latter were stranded after high flows exceeded the capacity of the ladders, causing some adults to try to ascend the dam to outside of the fishways." Because ODFW (1991) research crews rarely observed an unspawned coho carcass during 1975-1986, they concluded, "We concluded that rate of pre spawning mortality was low for coho salmon in the Rogue River, probably because water temperature were generally lower than 15° C during the period of migration."

Further, there is also no evidence of migration delays for coho at Savage Rapids Dam, and ODFW (1991) concluded that coho tended to pass the dam earlier in years of higher flow. Typically, adult fishways that function poorly would result in greater migration delays as flows increase, which is the opposite of the ODFW finding. Thus, the occasional coho jumping out of the ladder is the only problem indicated for adult coho passage at Savage Rapids Dam. Fences have been placed along the fishways to prevent fish from jumping out, and possible stranding of fish from swimming out of the fishways will be monitored daily if high water occurs, similar to that experienced in 1984. Therefore, we expect no mortality of upstream migrating adults. We are aware that NMFS has concerns about hydraulics within the ladder, and that the ladder

configuration might lead to fish fallback over the dam, but the studies we cited here provide no indication that the coho are experiencing a problem during their passage.

The most notable effects of Savage Rapids Dam on adult fish passage in the past have been on spring chinook and steelhead during periods of high flow. When flow exceeds roughly 10,000 cfs, spill occurs over all bays of the dam and the attraction flows into the ladders become difficult for adult fish to locate. This results in delay of upstream migration until flows recede. Some fish may become injured from jumping onto rocks or falling back onto rocks during these high flow conditions. Additionally, some adults become stranded in pools on the rocky outcroppings as flows recede. These trapped fish have usually been captured and returned to the river by biologists. We assume that such rescue operations will continue following these uncommon flow events, and that direct mortality to adult steelhead and chinook will limited to an occasional fish as observed in the past. Prespawning mortality of spring chinook is most often observed in low flow years, rather than high flow years, so we have no direct evidence from which to estimate impaired spawning success of individuals that experience migration delay at Savage Rapids Dam during high flow events. Cramer et al. (1985) estimated that prespawning mortality of spring chinook above Gold Ray Dam amounted to 5.9% to 7.1% of wild adults each year during 1978-1981, but was 33.8% during the low flow year of 1977. The observed prespawning mortality rates during 1978-81 in the vicinity of spawning areas are well within the normal range observed for spring chinook in other rivers.

II. ANTICIPATED IMPACT ON THE HABITAT OF ROGUE RIVER COHO, CHINOOK, AND STEELHEAD AT THE SAVAGE RAPIDS PROJECT

The modifications in operational and maintenance procedures of the GPID water diversion activity have not shown any detectable impacts to the habitat of the forebay area of the Savage Rapids project. Improved habitat conditions may be detectable in the tailrace area of the project because of changes in the spill pattern (over the dam crest onto the mid-channel rock abutment) and in the hydraulic profile resulting from the modified stop log design and placement.

Interim operations will not alter the habitat conditions (*e.g.*, riparian, littoral, and sub-littoral) of the upstream zone affected by the hydraulics of the forebay area (pool)of the Savage Rapids dam, that have existed for over 75 years. Structural and operational modifications of the dam crest, implemented under this alternative will have a positive impact relative to the hydraulic conditions in the tailrace zone downstream of the Savage Rapids dam.

The Dam Removal/Pumping Plan will alter the current habitat conditions (e.g. riparian, littoral, and sub-littoral) of the upstream and downstream areas affected by removal of the Savage Rapids dam. The in-stream habitat will be returned to a pool-riffle type in an incised channel that existed prior to the Savage Rapids dam. The littoral and sub-littoral animal/plant community of this riverine habitat will substantially reduce the flat-water pool that is maintained behind the dam during summer, and may alter the

species composition of fishes occupying the previously inundated stretch of river. If predatory fish congregated in the forebay or tailrace of the dam during its seasonal operation, then mortality of juvenile salmon and steelhead passing the dam would have been elevated compared to a free-flowing river. Any such increase in predation mortality above the ambient level would be eliminated by removal of the dam.

III. STEPS TO MINIMIZE IMPACTS OF INTERIM IRRIGATION DIVERSIONS ON THE ROGUE RIVER SALMONID POPULATIONS

Steps to minimize impacts of Savage Rapids Dam on salmonids will be taken as described below. Additionally, pending dam removal, Grants Pass Irrigation District will continue to seek the advice of its consultants and staff to make reasonably practicable adjustments to improve fish passage at the dam. The District will devote the remaining portion of its $265,000 grant from the State of Oregon to improve fish passage facilities at the Dam that the District, its consultants, and NMFS deem reasonable.

A. Dam Operations Pending Dam Removal

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1. North Turbine/Pump Intake

GPID will not divert water at the North Turbine/Pump Intake prior to May 7, 2000. Thereafter, so long as measured impacts on listed salmonids do not exceed the trigger levels identified in the monitoring plan below, the start date shall be advanced by one week each year insofar as the District deems an earlier start date necessary for appropriate service to its patrons. As set forth below, irrigation diversions at the North Turbine/Pump Intake will also be halted when trigger levels of listed coho are present.

GPID will continue to operate and maintain a brush seal at the base of the traveling screens, as well as a screen backwash system. GPID will continue to operate and maintain the seal improvements between traveling screen panels. GPID will attempt to eliminate gaps bigger than 1.75 mm. GPID will also continue to operate and maintain the other interim measures installed prior to the start of water diversions in 1998-2000 including modifications to the bypass system.

GPID will clear debris from the trash racks in front of the traveling screens on a daily basis. GPID will also inspect and attempt to clean the bypass ports daily.

2. South Gravity Intake

GPID will operate and maintain the interim measures installed prior to the start of water diversions in 1998-2000, including maintaining the new screen, the motorized screen cleaner, the light at the head gate, the perforated baffle plates behind the juvenile fish screens, and the neoprene seals around the screens. GPID may divert water into the South Gravity Intake at any time, provided GPID does not exceed a 0.4 fps approach velocity at the bar screens

3. Fall Operations

GPID shall complete all stoplog removal by November 1, 2001.

B. Alternatives Considered And Rejected

The District has considered and rejected several alternatives to the Dam Removal/Pumping Plan. Those alternatives include: (1) "no action"; (2) altering irrigation operations; and (3) replacing the north irrigation facilities; and (4) alternative dam removal plans.

1. Under the "no action" alternative, the District would make no changes to its historic operations, albeit leaving recent improvements in place. Under this alternative, no monitoring of impacts to fish would occur, and there would be no triggers for the shut-down of operations. This alternative was rejected as too costly and uncertain, since it would entail continued litigation concerning the application of the Endangered Species Act to Savage Rapids Dam and the propriety of the listing of SONC coho as threatened, unless NMFS were to grant a long-term ITP for an HCP that would require no changes to historic operations of the dam.

2. The District has rejected more extensive alterations to irrigation operations in that further restrictions are impracticable as undermining the District's reason for being—to deliver water to its patrons.

3. Replacing the north irrigation screens with new screens in compliance with NMFS screen criteria, while leaving the Dam and its water-powered turbine pumps in place, would eliminate all pumping-related juvenile mortality at the Dam site. No monitoring of impacts to fish would occur, and there would be no triggers for the shut-down of operations. The District's rejection of this alternative is primarily predicated on the apparent impossibility of obtaining a long-term ITP from NMFS for this alternative; it probably poses the most cost-effective means of further reducing mortality at the Dam.

4. The District has also considered and rejected alternative dam removal plans presented in comprehensive settlement negotiations in *United States v. Grants Pass Irrigation District*. A federal court order forbids discussion of the nature of those proposals and the District's responses to them.

IV. STEPS TO MONITOR IMPACTS OF THE GRANTS PASS IRRIGATION WATER DIVERSION ACTIVITY ON THE ROGUE RIVER COHO, CHINOOK, AND STEELHEAD AT THE SAVAGE RAPIDS SITE

The existing traveling screen bypass trap will be operated at the North Turbine-Pump Intake, unless NMFS and GPID agree to some other location. GPID will not divert any water at the North Turbine-Pump Intake until the bypass trap is installed

and fully operational. GPID will monitor the bypass trap, and potentially shut down its water diversion, as described below. A representative from NMFS may participate in the monitoring.

During the first two days of operations, GPID will sample the trap at the traveling screen bypass every three hours, beginning no later than three hours following the initial start of irrigation diversion. GPID will immediately cease diversion activities for seventy-two (72) hours if a cumulative total of 100 or more Age 1+ juvenile coho are observed in the trap at any time during a twenty-four (24) hour period. A NMFS representative may be present during this two-day period.

Thereafter, until June 15th, GPID will sample the trap at the traveling screen bypass every 12 hours during water diversion operations, and until July 15th, sample once daily. During this time, GPID will immediately cease diversion activities for forty-eight (48) hours if 100 or more Age 1+ juvenile coho are counted in the trap at the traveling screen bypass during a twenty-four (24) hour period.

For purposes of these "trigger" calculations, five Age 0+ fish will be considered to be the equivalent of one Age 1+ fish.

GPID will also continue a net-based sampling program on one of the two canals flowing from the Tokay Canal/Evans Creek Lateral headworks to quantify numbers of fish which may be bypassing screens. Monitoring of the net will occur daily during each business day after water diversions begin at the North Turbine-Pump Intake and continue through July 15th.

GPID will sample impingement using a washbasket for at least six daylight hours and at least six nighttime hours per week.

V. FUNDING THE HCP

The District believes that its financial resources, including the ability under Oregon law to assess patrons charges for services, will be sufficient to implement its portion of the Dam Removal/Pumping Plan, as well as conducting interim operations and monitoring as set forth above. However, the District's capacity to raise patron rates further is very limited in light of the enormous increases in recent years and ability of patrons to "opt out" of the District. Attached as Appendix B are spreadsheets showing *pro forma* projections of the District's budget and costs during implementation of the Dam Removal/Pumping Plan, together with a summary of historical rate increases.

In addition, as noted above, the State of Oregon provided a $265,000 fund for interim fish passage improvements at the dam, of which roughly $125,000 remains unspent, prior funds having been spent on monitoring and evaluation activities demanded by NMFS. These funds will be available for further operational and structural improvements that the District, its consultants, and NMFS deem reasonable in light of the

ultimate removal of the Dam, but the funds must be expended by July 1, 2001.

Respectfully submitted,

James L. Buchal
Attorney for the Grants Pass Irrigation District

APPENDIX A

Status of Rogue River Coho Salmon

All measures of population status for coho salmon in the Rogue River Basin above Savage Rapids Dam (km 173) indicate that spawning escapements and production of juveniles has been increasing since about 1980, following a period of depressed returns in the 1960's and 1970's. Indices of adult coho abundance in the Rogue Basin are available from counts of fish passing Gold Ray Dam (km 202) during 1942 through 1997 (Figure 1.1), and passing Huntley Park (km 13) during 1979-1986. Counts at Gold Ray Dam show that coho run size was in the neighborhood of 2-4 thousand fish during the 1940's, declined to less than a 200 fish for most years during the 1960's and 1970's, and has returned to the 2-4 thousand fish range during the last 4 years. The abundance of out-migrating juvenile coho passing Savage Rapids was estimated by ODFW (1991) during 1976-1986, and also shows an increase in abundance since 1980 (Table 1.1)[1]. It is noteworthy that the escapement of wild coho in the Rogue River has increased at a time when NMFS (60 FR 38011-38030) has found that coho returns throughout California and Oregon are depressed.

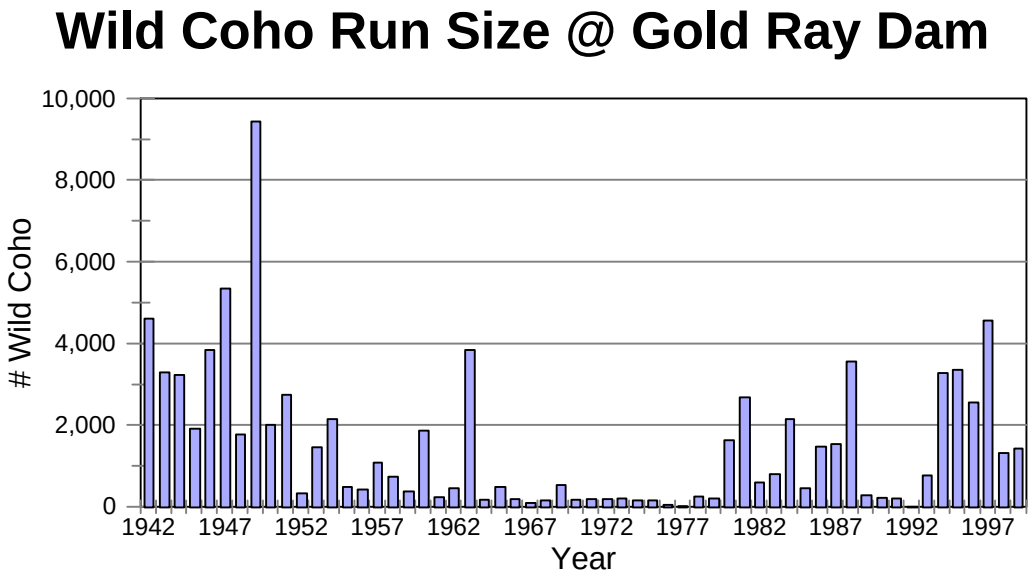


Figure 1.1. Run size of wild coho into the upper Rogue River as estimated from counts of coho passing Gold Ray Dam (km 202), 1942-1999. Data from personal communication, M. Evenson, ODFW, Grants Pass.

[1] Sampling of juvenile migrants at Savage Rapids Dam was discontinued by ODFW after 1990, and the data for 1987-1990 have not been expanded to estimate the total number of outmigrants.

Table 1.1. Number of wild yearling coho estimated to have passed Savage Rapids Dam each week during mid May through mid July, 1975-1986. From ODFW (1991).

Year	20-May	27-May	03-Jun	10-Jun	17-Jun	24-Jun	01-Jul	08-Jul	15-Jul	22-Jul	Total
1975						0	0	0	0	0	0
1976	200	129	0	0	0	0	0	0	0	0	329
1977	0	0	216	1,325	1,212	434	197	56	26	17	3,483
1978	0	0	87	0	0	58	0	0	0	0	145
1979	784	1,303	114	35	0	0	0	0	0	0	2,236
1980	0	0	54	268	0	0	0	0	0	0	322
1981	0	102	98	224	0	31	0	0	0	0	455
1982	91	1,069	160	625	337	160	0	128	0	0	2,570
1983	1,549	1,432	4,057	6,739	474	101	69	0	0	0	14,421
1984	0	273	0	0	0	0	0	0	0	0	273
1985	40	102	156	1,227	1,041	181	0	0	0	0	2,747
1986	400	587	503	2,203	3,619	2,086	1,711	757	126	61	12,053

Spatial Distribution Of Coho in the Rogue Basin

At the completion of 12 years (1975-1986) of intensive studies of salmon and steelhead populations in the Rogue River, ODFW concluded that most wild coho in the basin returned to areas downstream of the principal counting station, Gold Ray Dam (ODFW 1991). The studies by ODFW were focused on the main stem Rogue, and included little sampling in tributaries. Their sampling in the main stem, and the seasonal appearance of juvenile coho in their samples, led ODFW (1991; p.1) to the following deduction: "Juveniles reared in tributaries, primarily within the Illinois River Basin, rather than in the Rogue River. The area upstream of Grants Pass produced few wild juveniles." Further, ODFW recommended additional sampling to confirm the distribution of juvenile coho salmon rearing, as follows: “The Illinois River Basin should receive first priority for surveys, because it appears to produce most of the wild fish. Surveys of juveniles suggested that few wild fish spawn in streams upstream of the Illinois River." Thus, evidence indicates that at least through 1986, most of the wild coho population spawned and reared in the basin downstream of Savage Rapids Dam.

More recent stream survey data that indicate the specific streams of the Rogue Basin in which coho spawn and rear were compiled by the Rogue Basin Steering Committee (RBSC 1996). The Steering Committee identified 110 streams within the Rogue Basin that contained coho, and had 1,007 miles of coho habitat. Seventeen of these streams were designated by the Oregon Governor’s Salmon Recovery Team as “core” areas for coho salmon production. These core areas total 177 stream miles in the Rogue Basin (Table 1.2), and 107.6 of these miles (61%) enter the Rogue River downstream of Savage Rapids Dam. Therefore, the distribution of core habitat tends to confirm the finding that a majority of wild coho are produced in the basin downstream of Savage Rapids Dam.

Table 1.2. Streams designated by the Oregon Governor's Salmon Recovery Team as "core" areas for coho salmon production in the South Coast Basins of Oregon, including the Rogue. From RBSC (1996).

Watershed	Miles		Watershed	Miles
Upper Rogue Watershed			**Illinois Watershed**	
West Fork Trail Creek	5.6		Sucker/Grayback Creek	16.0
Sugar Pine Creek (Elk Creek)	4.0		East Fork Illinois	18.4
West Branch Elk Creek	5.6		Althouse Creek	14.4
Total	15.2		Elk Creek/Broken Kettle Creek	9.2
			Dunn Creek	2.6
Little Butte Watershed			Total	60.6
South Fork Little Butte Creek	24.0			
			Applegate Watershed	
Bear Creek Watershed	0.0		Slate/Waters Creek	10.4
			Cheney Creek	4.8
Evans Creek Watershed			Williams Creek	6.4
West Fork Evans Creek	30.4		Total	21.4
Middle Rogue Watershed			**South Coast Watershed**	
Quartz Creek	3.2		Elk River	36.8
			Crystal Creek (Sixes)	5.6
Lower Rogue Watershed			Edson Creek	2.4
Quosatana Creek	1.6		Dry Creek (Sixes)	5.6
South Fork Lobster Creek	7.2		Murphy Canyon Creek (Sixes)	4.0
Silver Creek	3.2		Willow Creek (Floras)	4.8
Shasta Costa Creek	10.4		Bethel Creek (New River)	6.4
Total	22.4		Butte Creek (New River)	3.2
			South Fork Fourmile Creek	4.0
			Total	42.8
			Grand Total	**220.0**

Further confirmation of the rearing distribution of wild coho salmon can be gained by comparing estimates of wild coho adults entering the Rogue River during 1979-1986 to those passing Gold Ray Dam. The estimated number of coho passing Huntley Park (km 13) that were later counted passing Gold Ray Dam varied from 10.8% to 94.4% , but was less than 50% in 6 of the 8 years (Table 1.3). The accuracy of the estimates at Huntley Park were confirmed by the high correlation between estimates of hatchery coho at Huntley Park and the number of hatchery coho returning to Cole Rivers Hatchery (ODFW 1991). Further, ODFW (1991) estimated that

only about 5% of coho were caught in river fisheries and 2% died from prespawning mortality, so most of the coho unaccounted for between Huntley Park and Gold Ray Dam must have spawned in areas downstream of Gold Ray Dam.

Table 1.3. Percentage of the estimated coho run passing Huntley Park (km 13) that also passed Gold Ray Dam (km 202) during 1979-86. Data for Huntley Park from ODFW (1991), and for Gold Ray Dam from personal communication, M. Evenson, ODFW, Grants Pass.

	Wild Coho Run Size		% of Entry That
Year	**@ Gold Ray**	**@ Entry**	**Passed Gold Ray**
1979	201	1,282	15.68%
1980	1,629	2,055	79.27%
1981	2,683	5,617	47.77%
1982	597	2,486	24.01%
1983	796	843	94.42%
1984	2,139	19,757	10.83%
1985	459	3,296	13.93%
1986	1,474	3,723	39.59%

Timing of Coho Migrations in the Rogue River

Coho salmon migrate downstream passed Savage Rapids Dam as juveniles in the spring and early summer, and upstream passed the dam as adults 18 months later in October to December. We first describe the timing and magnitude of juvenile migrations, and then follow with a description of adults migrations. These descriptions focus on the time of passage at Savage Rapids Dam.

Juvenile coho typically rear through one entire year in the area where they were spawned, and then migrate to sea as yearling smolts in the spring. A small portion of coho also move downstream in their first spring of life shortly after emerging from the gravel. Both the subyearling and yearling migrants have been detected passing Savage Rapids Dam, but yearling migrants were several fold more abundant than sub-yearlings among coho collected from samples of downstream migrants at Savage Rapids Dam during 1976-1986 (ODFW 1991). Continued sampling by ODFW at Savage Rapids in 1987-1990 indicated that subyearling migrants were more common in 1988-1990 (personal communication, T. Satterthwaite, ODFW, Central Point). ODFW (1991) concluded from sampling in the lower Rogue that most juvenile coho were 12-13 cm (yearlings) at the time of ocean entry. Further, "Analyses of scales taken from returning adults indicated that all juveniles entered the ocean has yearlings,"(ODFW 1991). Thus, the available evidence suggest that subyearling migrants at Savage Rapids Dam either perish or rear downstream for another year before entering the ocean.

Although some subyearling coho have been captured at Savage Rapids Dam, other

evidence suggest that these fish were competitively displaced from the primary rearing areas upstream. First, sampling of juvenile rearing distribution within the upper Rogue main stem by seining indicated that juvenile coho reared near the areas in which they were spawned. Coho were observed spawning in the Rogue near km 250, but ODFW (1991) reported that from 1975 to 1986, "*Seining crews recaptured no subyearlings at sites downstream from High Banks. Small tributary streams, rather than large rivers, are the preferred summer habitat of juvenile coho salmon (Stein et al. 1972).*" The High Banks location cited by ODFW (1991) is 33 km upstream from Savage Rapids Dam. The absence of juvenile coho in sampling below that point is not trivial, because ODFW (1991) conducted seining weekly from January through October at Valley of the Rogue Park (km 183), Matson Park (km 148) and Almeda Park (km 116). Clearly, if any coho were rearing in these areas they were rare.

It has long been assumed by biologists that most coho moving downstream as fry had been competitively displaced by other coho, and that few of these fry migrants survived to adulthood. Chapman (1965) showed in three Oregon coastal streams that many fry emigrated from nursery areas during their first spring of life, but Chapman (1962) showed the fraction of coho emigrating as fry was positively related to density of fry after emergence, and "the emigrants are smaller on the average than cohorts remaining in the stream." Studies performed by ODFW in the 1980's to test the effectiveness of planting coho as subyearlings showed that many of the wild coho subyearlings in the planted streams were displaced downstream by the slightly larger hatchery fish, and that these test streams subsequently had fewer wild adults returning, compared to the unstocked control streams (Solazzi et al. 1990). The reduction in wild adults that Solazzi et al. (1990) observed (48%) in test streams, was roughly the same reduction they had observed in wild subyearlings in those streams (44%), indicating that the displaced subyearlings did not survive to adulthood. These results indicate that coho subyearlings displaced from their natal rearing area are likely to be at a survival disadvantage. Thus, coho that migrate as subyearlings are likely to be (1) smaller than their cohorts that held position, and (2) poor contributors to adult returns.

Although the contribution of coho fry migrants to production of adult coho is expected to be minimal, some of these fry probably do survive. A study by Del Skeesick of the Oregon Fish Commission (1970) on a tributary of the Wilson River showed that some subyearling coho migrated upstream from the Wilson River into the tributary during fall, and that these same fish returned downstream as smolts the next spring. This behavior of juvenile coho has been demonstrated in other streams along the West Coast. However, the important point to note from the Skeesick study was that smolts resulting from fish that reared all year in the tributaries outnumbered those that had migrated back into the tributaries by a factor of roughly 10 to 1. Given that subyearling coho passing Savage Rapids Dam have outnumbered yearling coho in recent years, the survival of subyearling migrants would have to be very low in order for them to compose only 10% of the coho smolts produced.

Yearling coho smolts were already passing Savage Rapids Dam at the time it began operation in most years (Table 1.4), and their migration peaked in late May to early June (Figure 1.2). Operation of Savage Rapids Dam, and the sampling of juvenile migrants in the bypass system, generally began each year sometime between April 1 and mid May (Figure 1.3), with the

last week in April being the median. Seine catches of coho yearlings in the lower Rogue at Agness (km 44) and Canfield (km 8) show that out-migration begins about the first of April, so it is clear that many coho smolts pass Savage Rapids in most years before the facility begins operating. On the other hand, 93% of all yearling coho that were accounted for had passed Savage Rapids by the week of June 17-23 (Figure 1.2).

Table 1.4. Weekly catch rate (fish/hour) of wild juvenile coho salmon in the downstream migrant trap at Savage Rapids Dam during 1987-1990. Trap was fish two days per week. Data from personal communication, T. Satterthwaite, ODFW, Central Point.

Age 0 Coho

Weekly Passing

	Week Ending Date																			
Year	**13-May**	**20-May**	**27-May**	**03-Jun**	**10-Jun**	**17-Jun**	**24-Jun**	**01-Jul**	**08-Jul**	**15-Jul**	**22-Jul**	**29-Jul**	**05-Aug**	**12-Aug**	**19-Aug**	**26-Aug**	**02-Sep**	**09-Sep**	**16-Sep**	**23-Sep**	**Total**
1987	373	208	136	51			80	90							87					26	1,050
1988	12,448	4,823	28,574	38,420	2,845	3,969	1,799	155	126		485	227	33	70	130	77					94,180
1989		3,329	1,407	2,953	5,627	1,635	323	209				80									15,563
1990		178	1,406	518	2,596	128	61	319		67	232	43									5,546
1987	35%	20%	13%	5%	0%	0%	8%	9%	0%	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	2%	
1988	13%	5%	30%	41%	3%	4%	2%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
1989	0%	21%	9%	19%	36%	11%	2%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	
1990	0%	3%	25%	9%	47%	2%	1%	6%	0%	1%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	
Avg	12%	12%	19%	18%	22%	4%	3%	4%	0%	0%	1%	1%	0%	0%	2%	0%	0%	0%	0%	1%	
Catch per hour																					
1987	0.10	0.09	0.06	0.02			0.02	0.02							0.02					0.02	
1988	0.96	0.58	7.32	4.40	0.17	0.60	0.44	0.04	0.04		0.23	0.15	0.02	0.04	0.04	0.02					
1989		0.25	0.12	0.25	0.52	0.25	0.06	0.04				0.02									
1990		0.04	0.25	0.04	0.33	0.03	0.02	0.12		0.02	0.10	0.02									

Age 1+ Coho

Weekly Passing

	Week Ending Date																			
Year	**13-May**	**20-May**	**27-May**	**03-Jun**	**10-Jun**	**17-Jun**	**24-Jun**	**01-Jul**	**08-Jul**	**15-Jul**	**22-Jul**	**29-Jul**	**05-Aug**	**12-Aug**	**19-Aug**	**26-Aug**	**02-Sep**	**09-Sep**	**16-Sep**	**23-Sep**	**Total**
1987		363	226	256	617		80	90													1,634
1988			1,948	3,262		547	257	78	189												6,282
1989	3,934	1,110			675	817	108														6,644
1990		711	117	259	162	383	548	159	156	67											2,562
1987	0%	22%	14%	16%	38%	0%	5%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
1988	0%	0%	31%	52%	0%	9%	4%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
1989	59%	17%	0%	0%	10%	12%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
1990	0%	28%	5%	10%	6%	15%	21%	6%	6%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Avg	15%	17%	13%	20%	14%	9%	8%	3%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Catch per hour																					
1987		0.23	0.16	0.16	0.39		0.03	0.03													
1988			0.45	0.34		0.08	0.06	0.02	0.06												
1989	0.22	0.22			0.17	0.33	0.06														
1990		0.27	0.03	0.03	0.03	0.13	0.30	0.10	0.07	0.03											

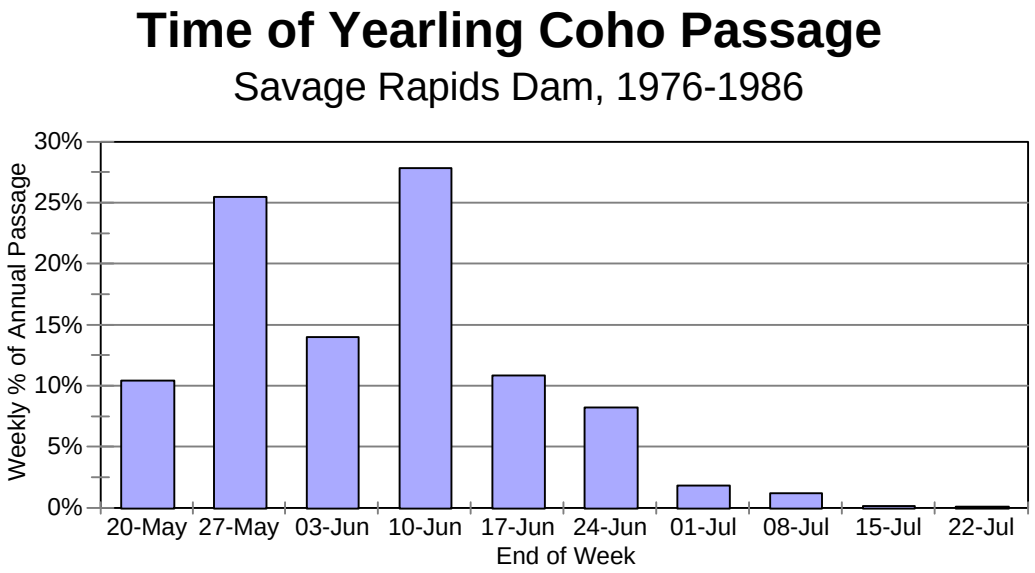


Figure 1.2. Mean percentage of the annual passage of coho yearlings at Savage Rapids Dam that occurred within each week, 1976-1986. Derived from data in Table 1.4. Passage during the week ending May 13 (not shown) was only sampled in 6 of 12 years, and coho were captured that week in only one of those 6 years (ODFW 1991). Thus, coho passage would be near zero prior to dates shown.

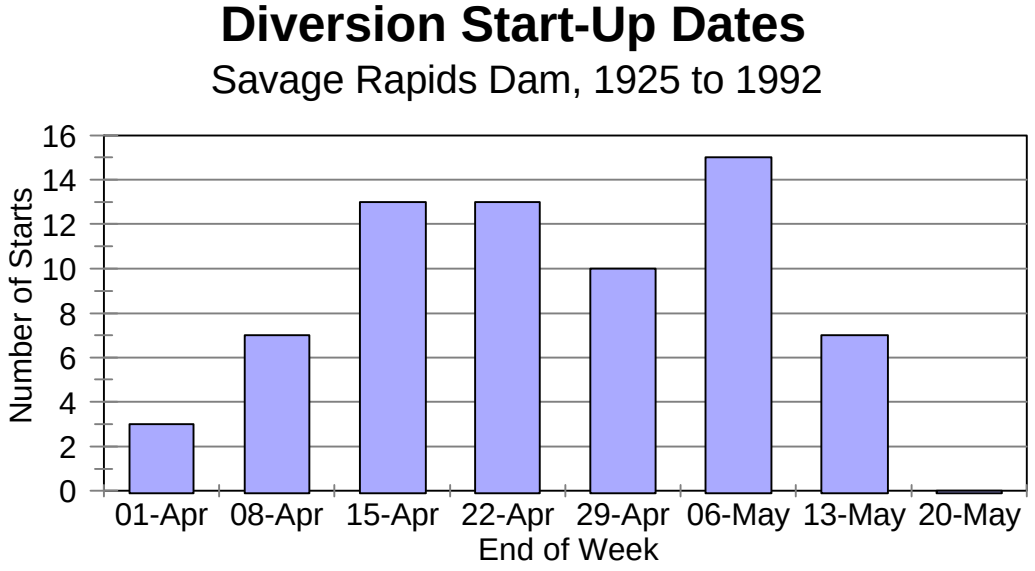
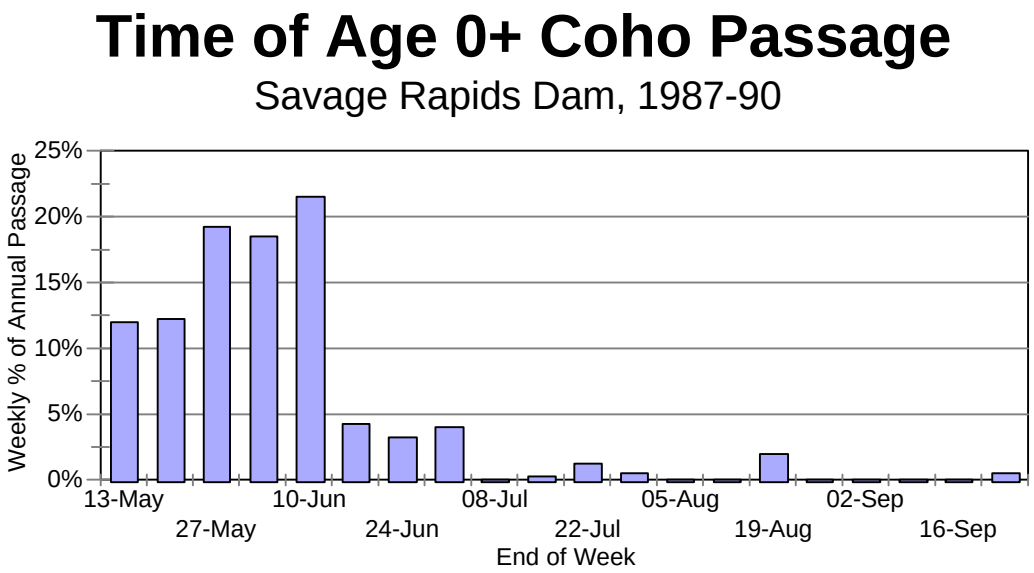


Figure 1.3. Frequency of start-up dates for water diversions at Savage Rapids Dam, 1925-1992. Data from Grants Pass Irrigation District.

Further confirmation of juvenile migration timing was found in data gathered by ODFW after completion of the intensive studies of 1975-1986. ODFW continued sampling with the downstream migrant trap at Savage Rapids during 1987-1990, but only for two days per week, and there has been no sampling since 1990. Because five of seven days each week were not sampled, and trapping efficiency was not re-tested, the data gathered during 1987-1990 are less reliable than those for 1975-1986. With that caution in mind, we see that emigration timing of yearling coho during 1987-1990 continued to be similar to that during 1975-1986, and that subyearling (age 0+) coho also migrated at about the same time (Figure 1.4). The catch rates of subyearling coho were substantially higher during 1988-1990 than they had been in previous years, and this may reflect either the increasing competition among juveniles as spawner abundance increases, or a downstream expansion of coho spawning that placed juveniles closer to Savage Rapids Dam.

Timing of adult coho passage at Savage Rapids Dam was best indexed by counts of fish passing Gold Ray Dam 29 km upstream. No fish are counted at Savage Rapids Dam. Passage at Gold Ray Dam peaked in late October or early November (Figure 1.5). Seining at Huntley Park indicated that coho salmon entered the Rogue River primarily during September-October (Figure 1.5). Thus, migration from river entry to Gold Ray Dam to the upper River required about one month. ODFW (1991) found that adult coho tended to pass Savage Rapids Dam earlier in years of higher flow, they concluded, “Because the operation of Lost Creek Dam increased river flow during the migration, adults passed Gold Ray Dam earlier than they would have if the dam had not been built.”



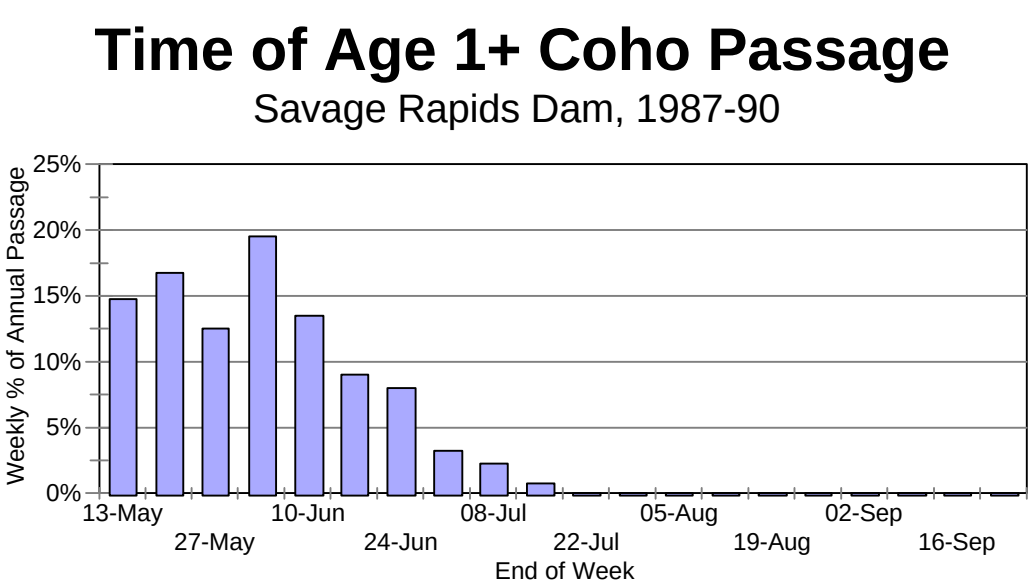
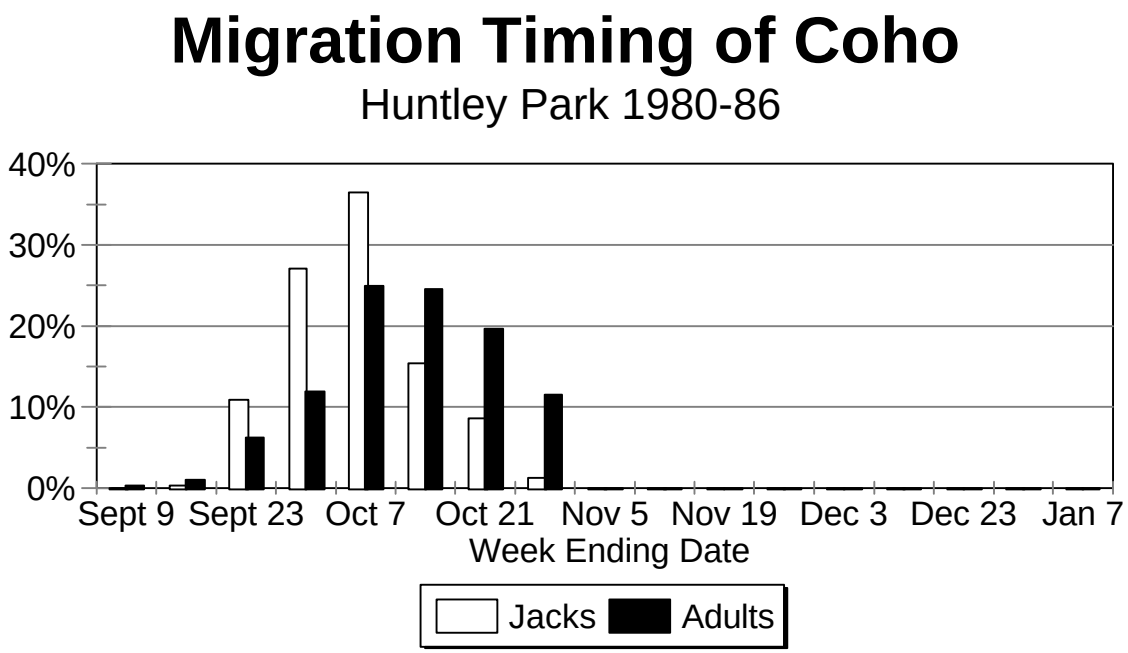


Figure 1.4. Mean percentage of the annual passage of coho yearlings at Savage Rapids Dam that occurred within each week, 1987-1990. Based on data in Table 1.4, and expanded to an index of total coho passage of coho each week as described by ODFW 1991. Trap data not available for weeks earlier than shown.



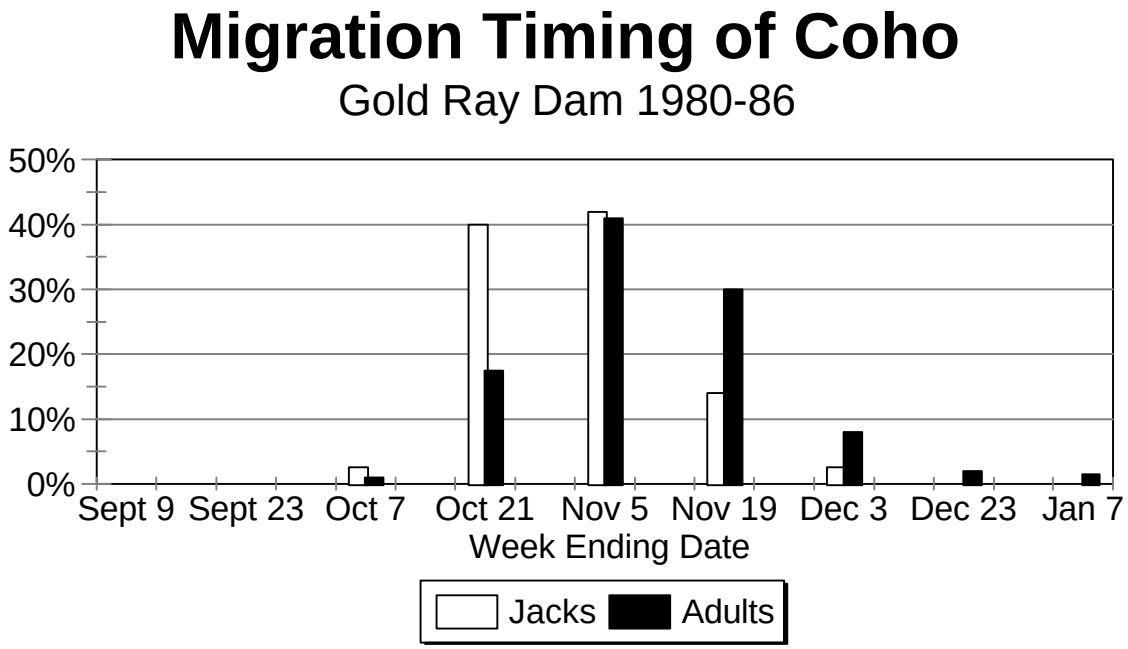


Figure 1.5 Mean time of adult coho passage at Huntley Park (top graph; km 9) and Gold Ray Dam (km 202) during 1980-1986. Passage at Gold Ray Dam was calculated biweekly while passage at Huntley Park was calculated weekly. Adapted from ODFW (1991).

STATUS OF ROGUE RIVER CHINOOK SALMON

Rogue River chinook were proposed by NMFS on March 9, 1998 to be listed as Threatened under the ESA (FR 63(45):11481-11520). The final determination on that proposal has been extended until September 1999, because, "substantial scientific disagreement precludes making final determinations," (FR 64(56): 14308). Rogue River chinook are part of the Southern Oregon-Northern California ESU. Large populations of wild spring and fall chinook continue to reproduce in the Rogue Basin.

ABUNDANCE AND DISTRIBUTION OF CHINOOK SALMON IN THE ROGUE BASIN

All spawning of spring chinook in the Rogue Basin is upstream of Gold Ray Dam (km 202), so both adults and juveniles must pass Savage Rapids Dam. Counts of adults passing Gold Ray Dam show that abundance of wild spring chinook during the 1990's have averaged about half of the mean counts during 1942-1989, but the abundance of fall chinook passing Gold Ray Dam increased by a corresponding magnitude during the 1990's (Figure 1.6 and 1.7). Changes in the temperature and flow regimes of the Rogue River due to water storage in Lost Creek Reservoir have resulted in an upstream shift in spawning of fall chinook above Gold Ray Dam , and a gradual displacement of the spring chinook in the lower one third of their spawning area.

Fall chinook spawn in tributaries and the main stem Rogue River from near its mouth up to several miles above Gold Ray Dam. During years of extensive spawning surveys by ODFW research personnel, about 50% of annual carcass counts were recovered in the lower Applegate River. The other area of most intensive spawning by fall chinook was the Rogue River main stem from km 139 to km 183, with up to 50% of carcasses recovered in those areas in some years. Generally, about 10% of fall chinook carcasses counted in all surveys were found above Savage Rapids Dam (km 173) during 1974-1981 (Cramer et al. 1985). There have been no carcass surveys in recent years to identify the specific locations where the increased number of fall chinook are spawning, but spawning surveys in the late 1980's revealed that spawning of spring and fall chinook overlapped between km 205 and km 240 (ODFW 1991b).

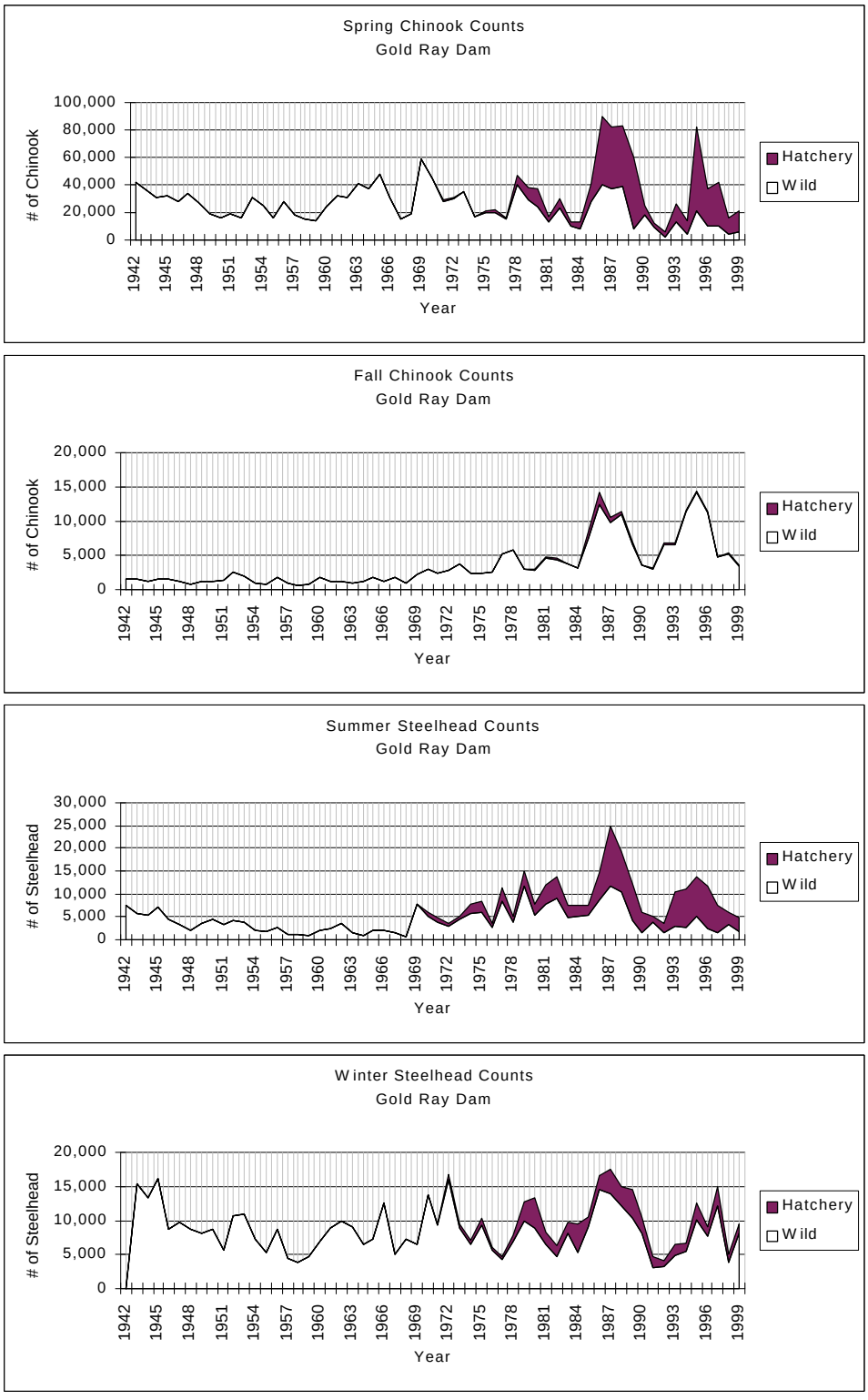
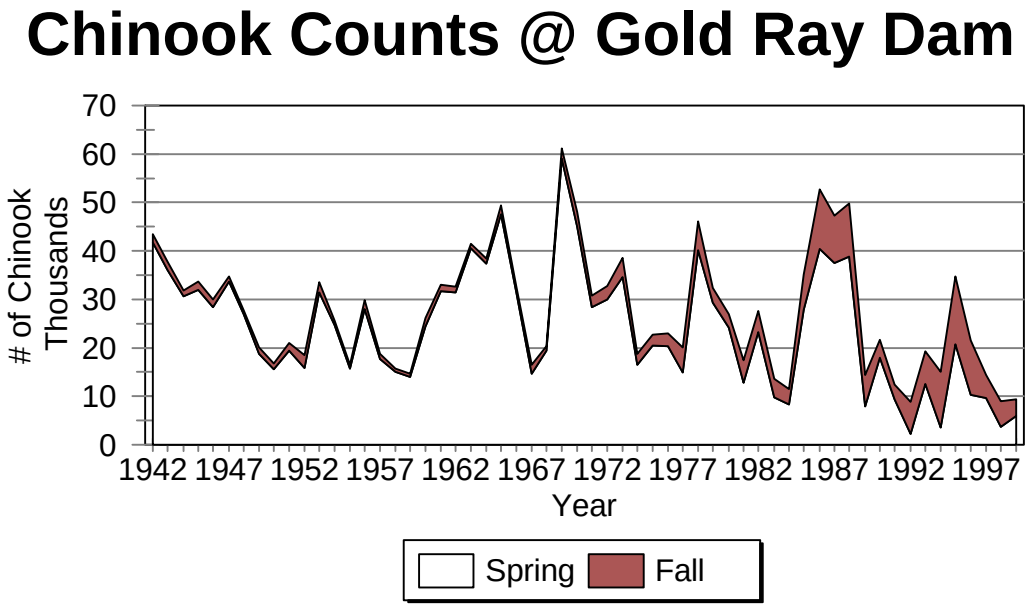


Figure 1.6. Abundance of adult salmon and steelhead passing Gold Ray Dam each year, 1942-1999. Data from Mike Evenson, ODFW, Grants Pass.



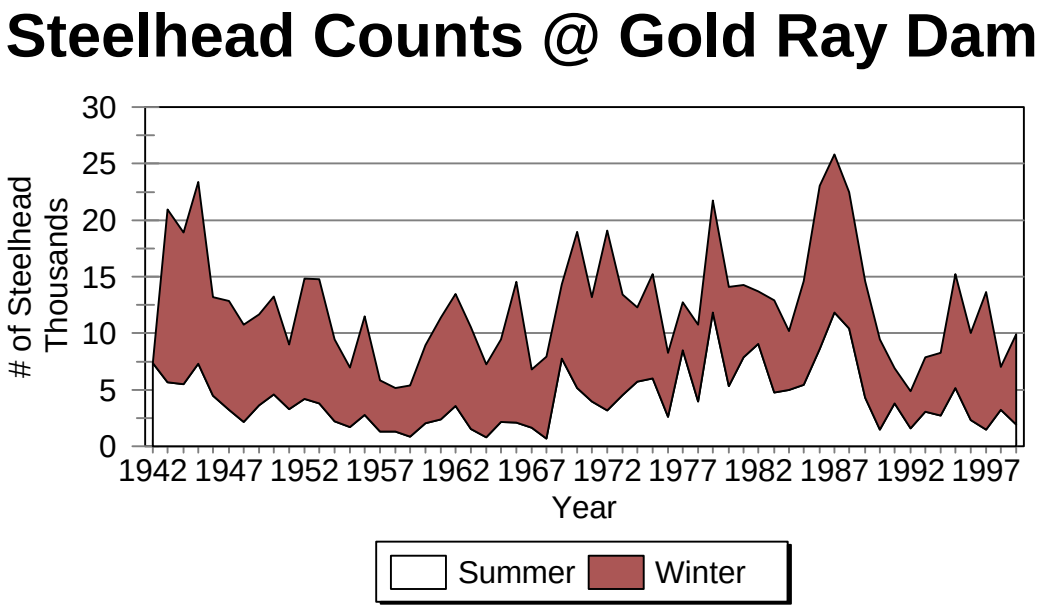


Figure 1.7. Abundance of wild adult spring and fall chinook combined, and summer and winter steelhead combined passing Gold Ray Dam each year, 1942-1999. Data from Mike Evenson, ODFW, Grants Pass.

TIMING OF CHINOOK MIGRATIONS IN THE ROGUE RIVER

Nearly all juvenile chinook passing Savage Rapids Dam are subyearlings, and their passage extends throughout the summer. Passage is greatest during mid July to mid August (Figure 1.8). Cramer et al. (1985) found that passage tended to be earlier in warm, low-water years, and later in cool high-water years. They found a high positive correlation ® = 0.95) between the percentage of migration that passed by July 15 and river temperature during spring (Figure 1.9). They found that only 15% of passage occurred by July 15 during cool years, and over 60% of passage had occurred by July 15 in warm years. Sampling with the Savage Rapids bypass trap in 1998 showed that catches of subyearling chinook peaked the first week of August, as would be expected for a high-flow, cool-temperature year (Cramer and Pellissier 1998).

Peak numbers of adult fall chinook enter the Rogue River during mid August through September, but those fish destined for the river above Savage Rapids Dam enter the lower Rogue River primarily in mid August (Cramer et al. 1985). Adult spring chinook pass Gold Ray Dam from mid May through mid August, with peak passage in late June (Figure 1.10).

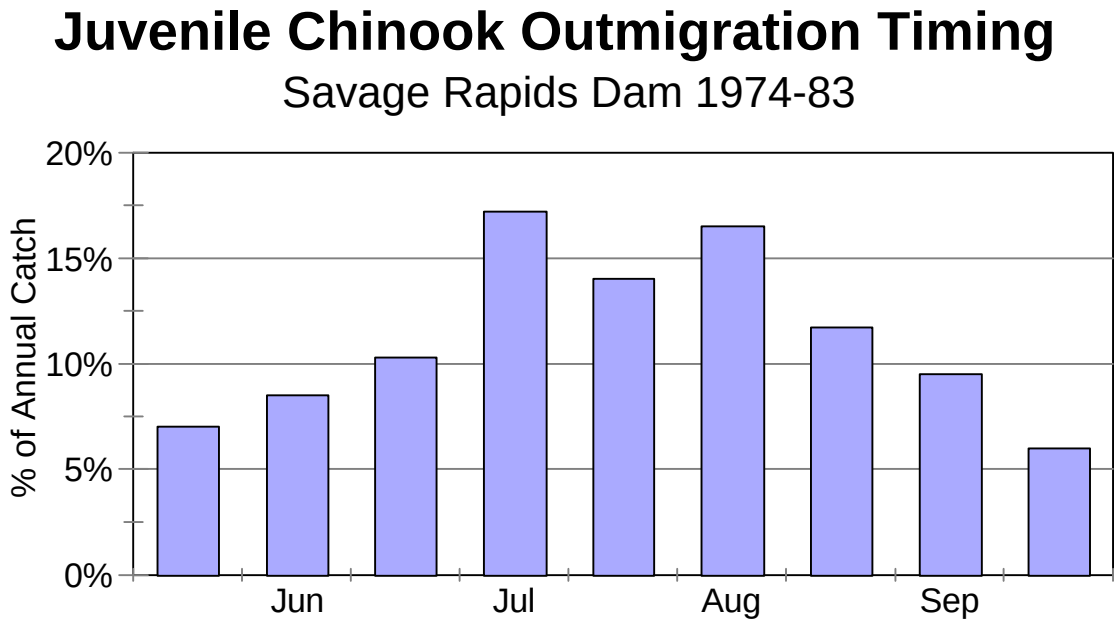


Figure 1.8. Average timing of subyearling chinook migrations past Savage Rapids Dam, 1874-1983. From Cramer et al. (1985).

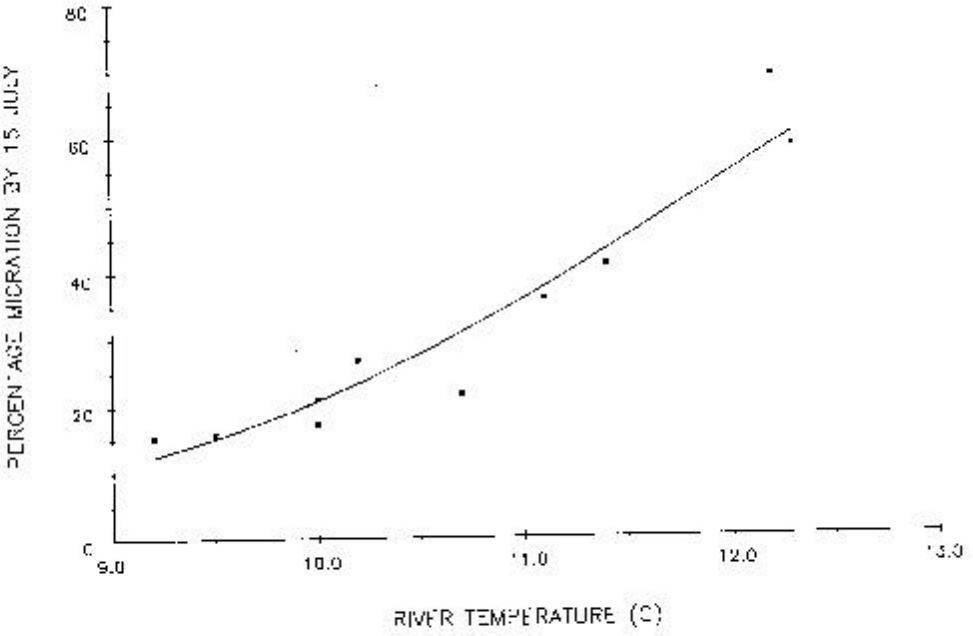
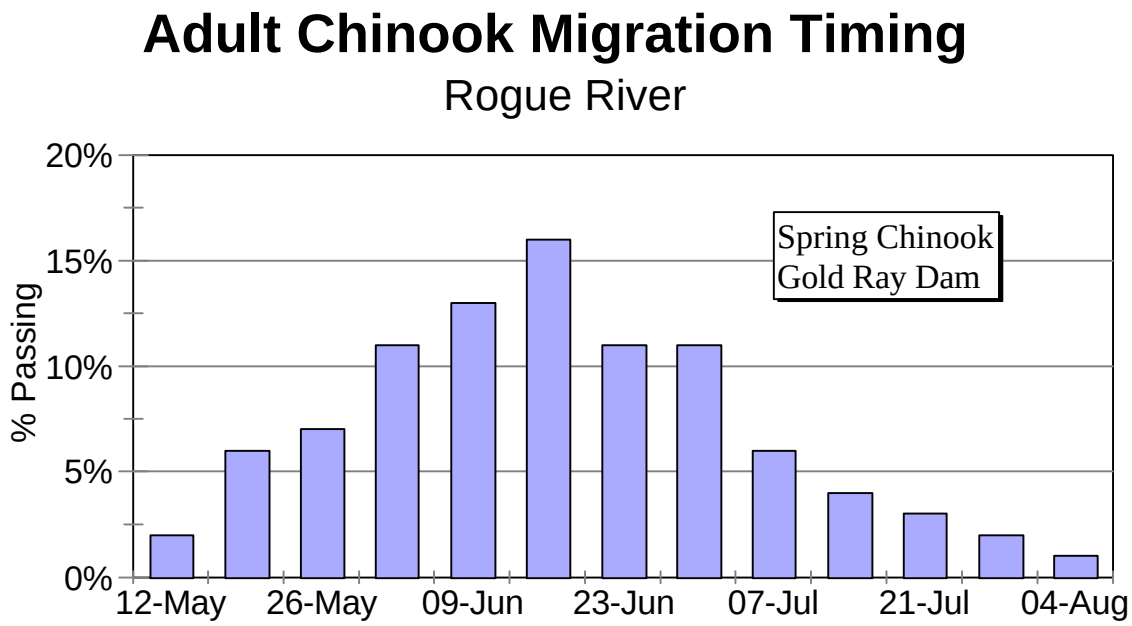


Figure 1.9. Correlation between the percentage of subyearling chinook passing Savage Rapids Dam by 15 July and the mean maximum water temperature at Dodge Bridge (km 223) during April-May, 1974-1983.



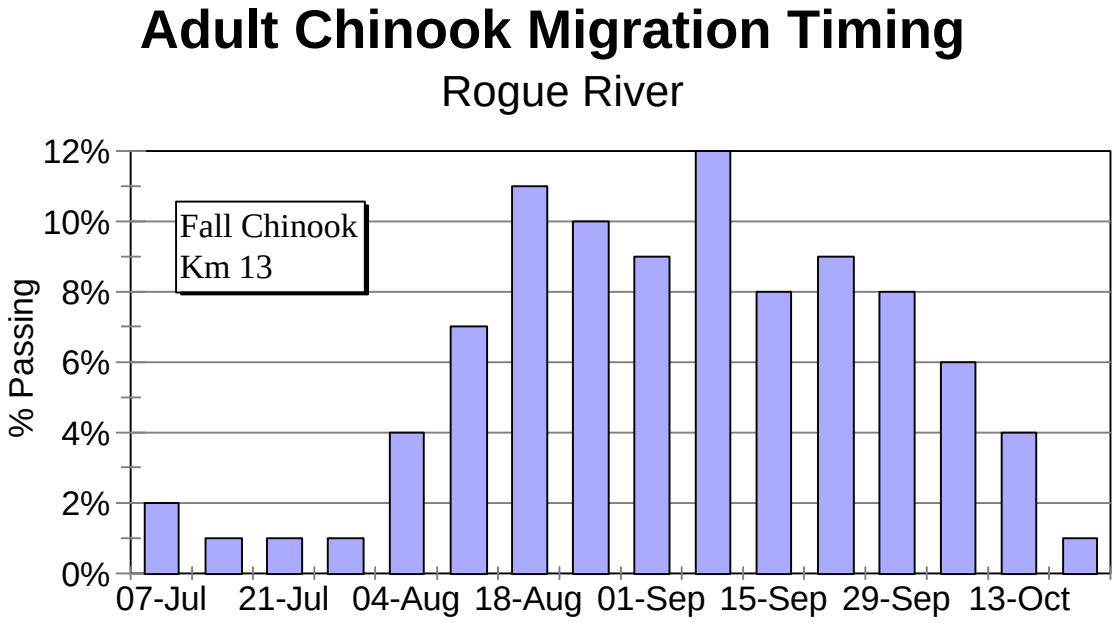


Figure 1.10. Average timing of spring chinook passage at Gold Ray Dam and fall chinook passage through the lower Rogue at km 13. From Cramer et al. (1985).

STATUS OF ROGUE RIVER STEELHEAD

The Rogue River supports the largest population of steelhead from any coastal stream in Oregon. Both summer and winter races are present, and are designated by NMFS as a Candidate Species for listing under the federal ESA..

ABUNDANCE AND DISTRIBUTION OF STEELHEAD IN THE ROGUE BASIN

Both summer and winter steelhead spawn and rear in the Rogue Basin up and downstream of Savage Rapids Dam. Annual counts of abundance are maintained at Gold Ray Dam, 29 km upstream of Savage Rapids Dam (km 173). Those counts show that counts of wild summer steelhead in the 1990's have been 1,450 to 5,100, which is less than during the 1970's and 1980's, but similar to the 1950's and 1960's (Figures 6 and 7). Counts of wild winter steelhead at Gold Ray Dam have fluctuated from 3,100 to 12,150 during the 1990's, a range similar that which has been observed since counts began in 1942 (Figures 6 and 7).

Summer steelhead spawn in tributary streams that enter the Rogue River primarily between river miles 65 and 159 (Everest 1973). Savage Rapids Dam is in the middle of this range at mile 107. Ninety-five percent of summer steelhead first return to the Rogue River as immature “half-pounders” (ODFW 1994), most of which do not migrate above mile 75 (Everest 1973).

Winter steelhead spawn throughout the Rogue Basin, and ODFW (1990) estimated that 13% to 25% of the winter steelhead entering the Rogue River passed upstream of Gold Ray Dam. There are limited spawning areas for steelhead between Savage Rapids and Gold Ray Dam, so it is probable that one forth or less of the winter steelhead in the Rogue Basin spawn about Savage Rapids Dam. Scale analysis has shown that about one third of winter steelhead in the Rogue River had first returned as immature “half-pounders” (ODFW 1990).

TIMING OF STEELHEAD MIGRATIONS IN THE ROGUE RIVER

Outmigration of juvenile steelhead past Savage Rapids Dam, includes fry, parr and smolts, with all three life stages moving primarily in the spring (Figure 1.11). Juvenile steelhead of ages 0+, 1+, and 2+ were captured in the north-side bypass trap during 1998, with over 80% of them being age 0+ (Cramer and Pellissier 1998). Catches of age 0+ steelhead were greatest during the last half of June, while catches of age 1+ and 2+ were greatest in mid June of 1998. Few steelhead were captured after July 11 in 1998.

Steelhead smolts (most are age 2+) migrate earlier in the spring than coho smolts, and most of their migration precedes the irrigation season. Thus, steelhead smolts (distinguished by their silvery appearance and black band on the margin of their tail) have only been captured in low numbers by early-season sampling of the bypass trap at Savage Rapids Dam. Emigration of steelhead smolts was probably complete except for a few stragglers by the time sampling of outmigrants began at Savage Rapids Dam in 1998. Cramer et al. (1985) found from weekly seining in the lower Rogue River that peak smolt emigration of steelhead was near the end of

March. Cramer et al. (1985) also found that analysis of scales from half-pounder and adult steelhead that March-May was the principle time of ocean entry for smolts.

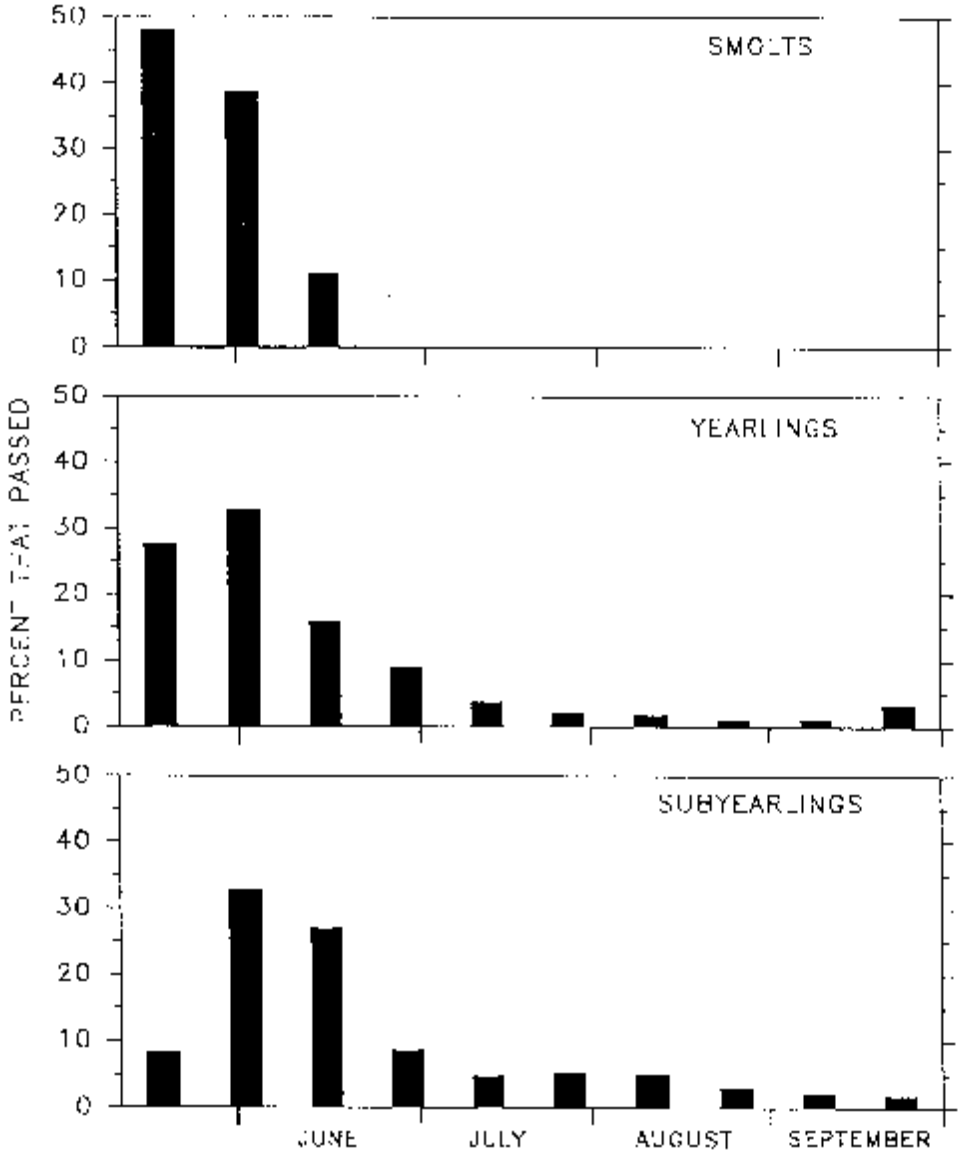


Figure 1.11. Migration timing of juvenile steelhead that passed Savage Rapids Dam from 14 May through 30 September, averaged for 1976-90. From ODFW (1994).

Timing of upstream migration for both summer and winter steelhead is protracted over several months. Adult summer steelhead passage at Gold Ray Dam peaks in mid July, tapers off for several months, and then peaks again about the first of November (Figure 1.12). Further, passage tends to be earlier in warmer years (Figure 1.13). Passage of adult winter steelhead generally peaks past Gold Ray Dam during March, and extends from early February to early May (Figure 1.13).

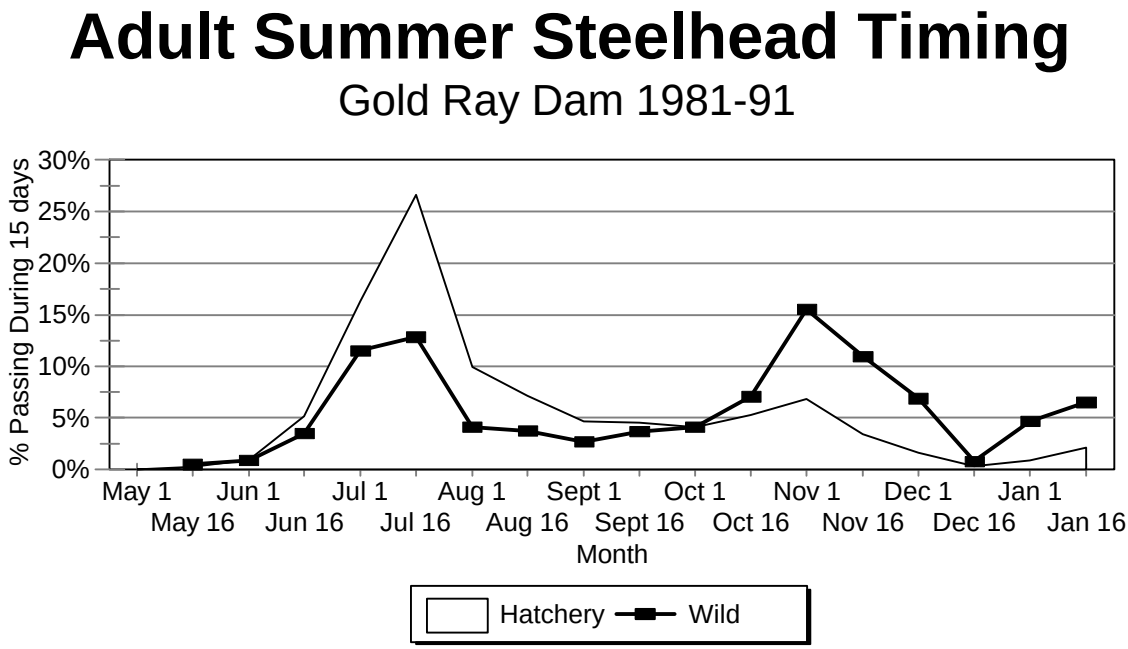


Figure 1.12. Time of upstream passage for adult summer steelhead at Gold Ray Dam, averaged for 1981-1991. Based on data presented in ODFW (1994).

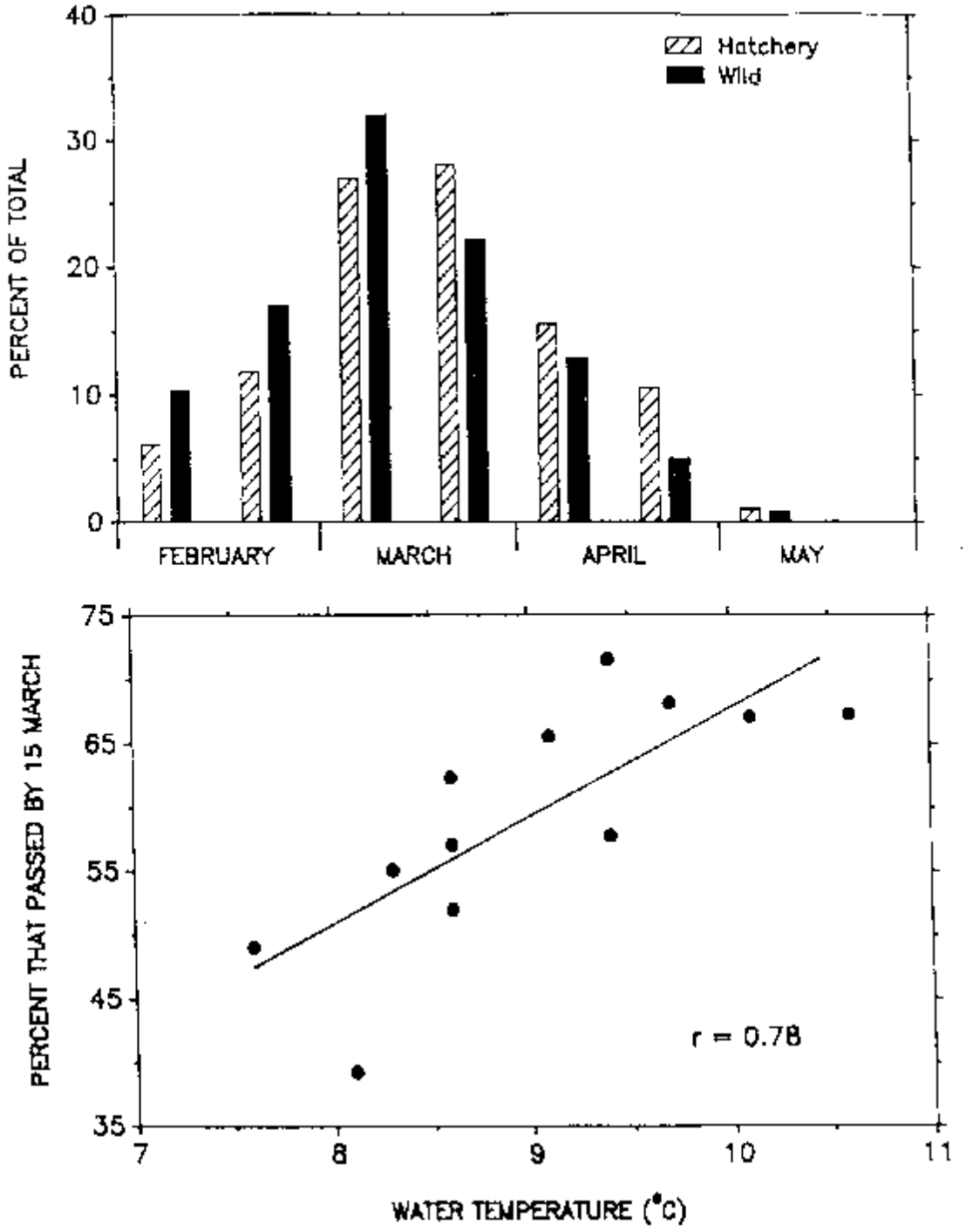


Figure 1.13. Time of upstream passage for adult winter steelhead at Gold Ray Dam, averaged for 1978-1987, and the correlation of passage timing to river temperature. From ODFW (1990).

RESULTS FROM MONITORING IN 1998 - 2000

Losses of juvenile salmonids at Savage Rapids Dam were monitored in 1998 - 2000 in compliance with a Joint Stipulation between the National Marine Fisheries Service and Grants Pass Irrigation District. The agreement was designed to minimize mortality or injury of juvenile coho salmon passing Savage Rapids Dam. Monitoring was conducted each year beginning with the initiation of irrigation diversion and continued until at least July 15 (see table below). Monitoring included fishing a trap in the fish bypass pipe on the north side of the dam to detect abundance of fish migrating downstream, fishing of fyke nets in one or more of the three main canals of diverted water to detect fish entrainment, and collecting backwash debris from the north-side fish screens to detect impinged fish. The percentage of the river that entered diversion intakes at the dam, when all diversions were fully operating, varied through each season and from year to year (Table 1.5).

Table 1.5 Dates that juvenile fish monitoring started and ended, and high and low water diversion rates at Savage Rapids Dam, 1998-2000.

	Monitoring		% of Diversion / Date	
Year	Start Date	End Date	Lowest Level	Highest Level
1998	Jun 8	Aug 11	15.3% / Jun 11	35.5% / Aug 11
1999	Jun 2	Jul 15	13.8% / Jun 1	25.8% / Jun 13
2000	May 16	Jul 15	19.6% / May 16	47.6% / Jul 13

Monitoring results, as reported by Cramer and Pellissier (1998, 1999, and 2000) demonstrated that fish protection measures were effective at limiting impacts on juvenile salmonids to low levels. In 1998, 1999 and 2000, the number of yearling coho captured in the bypass trap was 5, 0, and 2, respectively, indicating that most coho smolts (not age 0+) had already passed Savage Rapids Dam when the irrigation season started (Cramer and Pellissier, 1998, 1999, and 2000). In contrast, catches of yearling coho in the bypass trap averaged 5 to 10 coho per night during some of the years sampled by ODFW (1991), even though spawning coho were far less abundant during the years that ODFW (1991) sampled. Previous sampling by ODFW in years when flow at Grants Pass averaged near 5,000 cfs in May indicate that more than 95% of coho smolts would have emigrated before the June 10 (ODFW 1991). The mean May 1998 flow was 6,465 cfs, while the mean May 1999 flow was 4,808 cfs.

Catches of age 0+ coho, steelhead, and chinook in the bypass trap (an index of fish passage) varied from year-to-year in terms of numbers and timing (Table 1.6).

Table 1.6 Dates and catches of juvenile salmonids in the northshore bypass trap on the week of peak passage, 1998-2000.

	Week of Peak Passage / Mean Catch (fish/day)		
Year	Age 0+ Coho	Age 0+ Steelhead	Age 0+ Chinook
1998	6/12-18 / 9.4	6/19-25 / 34.5	7/31-8/6 / 73.0
1999	6/11-17 / 0.6	7/7-15 / 19.0	7/7-15 / 0.7
2000	5/22-28 / 3.7	7/3-9 / 42.9	7/10-16 / 575.0

More fish were captured in the screen backwash and canals during 2000 than during 1998 and 1999(Table 1.7). However, the total number of juvenile salmonids approaching the north-side screens was substantially greater in 2000 than in 1998 and 1999 (Table 1.6), so the increased backwash and canal catches were congruent with the increase in fish abundance.

Table 1.7 Sampling effort and total salmonids captured at sites to detect impingement or entrainment of juvenile salmonids at Savage Rapids Dam, 1998-2000.

	Total # Salmonids Captured in Each Sample Site / Length of Sample Period			
Year	Screen Backwash	S. Gravity Canal	Tokay Canal	S. Highline Canal
1998	24 in 51.5 hrs	0 in 37 days	6 in 47 days	17 in 41 days
1999	78 in 82.6 hrs	not sampled	17 in 43 days	not sampled
2000	151 in 92.9 hrs	not sampled	63 in 48 days	13 in 9 days
Mean	1.1 fish/hr	0	0.62 fish/day	0.6 fish/day

To assess the reduction in losses of juvenile salmon under the conservation measures that were applied in 1998-2000, we can compare the total number of juvenile salmon captured in the backwash and the three main irrigation canals to the number of fish that were captured in the bypass each sampling season (Table 1.8). The 1998 - 2000 catch in the backwash and canals was much lower than the catch found in 1979, the only previous sampling of fish entrainment into the canals. The 1979 sampling was performed in the Tokay Canal by ODFW and NMFS (Smith 1979).

Table 1.8 Comparison of juvenile salmonids captured in the north-side bypass to those in the screen backwash or the irrigation canals at Savage Rapids Dam, 1998-2000.

	Total # Fish Captured		
Year	Bypass	Backwash & Canals	No. in Backwash + Canals per 1,000 in Bypass
1998	1,746	47	27
1999	634	95	149
2000	9,965	227	23
1979	54,704	22,222 (Tokay only)	400

Replicated experiments using a floodlight to attract outmigrants to the spillway at night were performed in 1998 and showed that salmonid use of the fish bypass consistently dropped to less than one tenth that on adjacent nights without floodlights (Becklin et al. 1998). Fish entrainment through the screens, as sampled in each canal, was rare, so the fish that ceased using the bypass must have been attracted over the spillway. GPID has since adopted standardized use of three spillway floodlights during the irrigation season in expectation that they will reduce impingement and entrainment rates by 90% from those observed without floodlights.

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GRANTS PASS IRRIGATION DISTRICT

FIXED / VARIABLE EXPENSE TRACKING

17-Nov-00
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FIXED/VARIABLE EXPENSES

TYPE	COST % INC.		FIXED EXPENSES	98 EXPENSE	99 EXPENSE	00 BUDGET	01 BUDGET	02 BUDGET	03 BUDGET	04 BUDGET	05 BUDGET	06 BUDGET	07 BUDGET	08 BUDGET	09 BUDGET	10 BUDGET
F		7010	DIRECTOR'S FEES	$2,205	$1,745	$2,000	$3,000	$3,000	$3,000	$3,000	$3,500	$3,500	$3,500	$3,500	$3,500	$3,500
F		7011	DIRECTOR'S MEETING EXPENSE	$1,036	$1,493	$1,000	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500
F		7015	ELECTION EXPENSE	$2,563	$4,057	$5,000	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500
F		7060	EMPLOYEE EDUCATION	$6,091	$9,313	$5,000	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500
F		7070	MILEAGE REIMBURSEMENT	$97	$0	$200	$200	$200	$200	$200	$200	$200	$200	$200	$200	$200
F	5%	7110	OFFICE EXPENSE	$17,270	$15,677	$20,000	$20,000	$21,000	$22,050	$23,153	$24,310	$25,526	$26,802	$28,142	$29,549	$31,027
F	5%	7120	TELEPHONE EXPENSE	$5,199	$5,250	$5,000	$5,500	$5,775	$6,064	$6,367	$6,685	$7,020	$7,371	$7,739	$8,126	$8,532
F		7125	ADVERTISING-BOARD MEETINGS,ETC.	$988	$0	$1,000	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500
F	2%	7130	AUDIT EXPENSE	$3,510	$6,168	$7,000	$7,000	$7,140	$7,283	$7,428	$7,577	$7,729	$7,883	$8,041	$8,202	$8,366
F		7140	LEGAL FEES	$5,575	$13,489	$22,699	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
F	5%	7150	INSURANCE - LIABILITY	$66,256	$27,033	$34,636	$36,368	$38,186	$40,095	$42,100	$44,205	$46,416	$48,736	$51,173	$53,732	$56,418
F	5%	7155	W/COMP INSURANCE		$25,471	$5,364	$9,288	$9,752	$10,240	$10,752	$11,290	$11,854	$12,447	$13,069	$13,723	$14,409
F	3%	7160	DUES AND SUBSCRIPTIONS	$4,404	$4,728	$5,226	$5,000	$5,150	$5,305	$5,464	$5,628	$5,796	$5,970	$6,149	$6,334	$6,524
F		7165	LIEN EXPENSE	$3,000	$2,789	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
F		7180	OREGON STATE POWER RIGHT	$614	$714	$665	$665	$665	$665	$665	$665	$665	$665	$665	$665	$665
F	5%	7190	ELECTRICITY AT DAM	$1,519	$1,529	$1,500	$1,500	$1,575	$1,654	$1,736	$1,823	$0	$0	$0	$0	$0
F		7210	JANITORIAL ($125/MTH)													
F		7210	PLANT MAINTENANCE	$51	$11											
F		7210	PLANT MAINTENANCE - UGBA	$4,558	$4,631	$10,000	$6,000	$6,000	$6,000	$6,000	$6,500	$6,500	$6,500	$6,500	$6,500	$6,500
F		7210	UTILITIES/MATERIALS													
F	3%	7350	W/R OTHER - NEWSLETTERS	$555	$2,730	$3,500	$3,500	$3,605	$3,713	$3,825	$3,939	$4,057	$4,179	$4,305	$4,434	$4,567
F		7350	W/R OTHER - SUBDIVISIONS	$1,922	$2,176	$1,102	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
F		7400	WATER RIGHT TRANSFER - STATE	($6,400)	($4,400)	($200)	($200)	($500)	($6,400)	($6,400)	($6,400)	($6,400)	($6,400)	($6,400)	($6,400)	($6,400)
F		7410	WATER RIGHT CERT EXAMINER FEE	($9,600)	($6,600)		($300)	($600)	($9,600)	($9,600)	($9,600)	($9,600)	($9,600)	($9,600)	($9,600)	($9,600)
F		8130	HOUSE AT DAM	$316	$283	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500
F	5%	8510	FUEL AND OIL	$8,562	$11,726	$15,000	$20,000	$21,000	$22,050	$23,153	$24,310	$25,526	$26,802	$28,142	$29,549	$31,027
F	3%	8520	HAND TOOLS	$445	$1,708	$1,508	$1,500	$1,545	$1,591	$1,639	$1,688	$1,739	$1,791	$1,845	$1,900	$1,957
F		8545	FORECLOSURE FEES	$5,696	$7,476	$511	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000
F	10%	8710	ELECTRICITY BY LOCATION	$52,877	$55,288	$60,000	$65,000	$71,500	$78,650	$86,515	$95,167	$104,683	$115,151	$126,667	$139,333	$153,267
F		8820	BUREAU CONTRACT - DAM REHAB	$26,830	$26,842	$26,830	$26,830	$26,830	$26,830	$26,830	$0	$0	$0	$0	$0	$0
F		8830	TURBINE LOAN REPAYMENT				$26,225	$27,793	$26,968	$26,120	$30,118	$30,118	$30,118	$30,118	$30,118	$30,118
F		8960	GAIN/LOSS ON DISP. OF ASSETS	$0	$8,436	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
F		9510	ASSESSMENT REFUND	$2,685	$2,568	$121	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL FIXED COSTS				$208,827	$232,330	$239,161	$276,576	$289,117	$285,858	$298,446	$291,105	$304,828	$321,616	$339,755	$359,364	$380,576

TYPE			VARIABLE EXPENSES												
V		7115	COMPUTER EXPENSE	$2,229	$47,319	$20,271	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000
V	3%	7170	OFFICE EQUIP REPLACEMENT-UGBA	$35	$2,014	$4,764	$2,000	$2,060	$2,122	$2,185	$2,251	$2,319	$2,388	$2,460	$2,534	$2,610
V	3%	7310	WATER RIGHT - MATERIALS	$266	$579	$2,641	$2,000	$2,060	$2,122	$2,185	$2,251	$2,319	$2,388	$2,460	$2,534	$2,610
V	3%	7330	WATER RIGHT - LEGAL	$190,748	$125,607	$43,774	$15,000	$15,450	$15,914	$16,391	$16,883	$17,389	$17,911	$18,448	$19,002	$19,572
V		7340	WATER RIGHT - ENGINEERING			$446	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
V	3%	7360	WATER CONS. - MATERIALS	$991	$1,683	$3,000	$3,000	$3,090	$3,183	$3,278	$3,377	$3,478	$3,582	$3,690	$3,800	$3,914
V	5%	7360	WATER CONS. - OTHER	$1,610	$921	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
V		7390	LOBBYIST			$50,000	$50,000	$50,000	$50,000	$0	$0	$0	$0	$0	$0	$0
V		7510	FISH BIOLOGIST/ENGINEER	$140,559	$49,148	$50,000	$25,000	$25,000	$25,000	$25,000	$25,000	$0	$0	$0	$0	$0
V		7530	FISH TAKE - LEGAL FEES	$119,095	$118,759	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$0	$0	$0	$0	$0
V		7540	HABITAT CONSERVATION - MITIGATION			$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$0	$0	$0	$0	$0
V		8010	CONCRETE													
V	5%	8010	DITCH & PIPE - MATERIALS	$20,865	$37,986	$45,726	$60,000	$63,000	$66,150	$69,458	$72,930	$76,577	$80,406	$84,426	$88,647	$93,080
V		8010	GUNITE													
V		8010	LUMBER													
V		8010	PIPE/SHALE													
V		8011	DISTRIBUTION BOX PILOT PROJECT	$0	$0	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
V	5%	8030	CHEMICALS	$8,446	$9,160	$9,000	$10,000	$10,500	$11,025	$11,576	$12,155	$12,763	$13,401	$14,071	$14,775	$15,513
V	5%	8110	DAM MAINT. - MATERIALS	$3,915	$46,280	$32,063	$20,000	$21,000	$22,050	$23,153	$24,310	$0	$0	$0	$0	$0
V		8111	SAFETY			$5,000	$1,000	$1,000	$1,000	$1,000	$1,000	$0	$0	$0	$0	$0
V		8140	DAM IMPROVE. - CONTRACT LABOR & ENG.													
V	5%	8140	DAM IMPROVEMENTS - MATERIALS	$17,145	$6,617	$15,000	$10,000	$10,500	$11,025	$11,576	$12,155	$0	$0	$0	$0	$0
V	5%	8250	NEW PUMP MAINTENANCE									$48,600	$48,600	$48,600	$48,600	$48,600
V	5%	8210	PUMP MAINT. - MATERIALS (CONES & TECH)	$10,582	$12,282	$262,645	$30,000	$31,500	$33,075	$34,729	$36,465	$0	$0	$0	$0	$0
V	5%	8215	ELECTRIC PUMP MAINTENANCE	$899	$11,113	$35,000	$10,000	$10,500	$11,025	$11,576	$12,155	$12,763	$13,401	$14,071	$14,775	$15,513
V	5%	8310	EQUIP. MAINT. - MATERIALS	$7,321	$18,565	$15,000	$20,000	$21,000	$22,050	$23,153	$24,310	$25,526	$26,802	$28,142	$29,549	$31,027
V	5%	8410	FISH SCREEN MAINT - MATERIALS	$84,633	$1,204	$2,500	$2,500	$2,625	$2,756	$2,894	$3,039	$3,191	$3,350	$3,518	$3,694	$3,878
V	5%	8430	N. FISH SCREENS - MATERIALS	$772	$26,104	$14,909	$2,500	$2,625	$2,756	$2,894	$3,039	$3,191	$3,350	$3,518	$3,694	$3,878
V	5%	8530	EQUIPMENT REPLACEMENT	$10,320	$11,295	$7,500	$7,500	$7,875	$8,269	$8,682	$9,116	$9,572	$10,051	$10,553	$11,081	$11,635
V		8540	REIMB. LABOR AND MAT.	$262	$32	$126	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
V		8815	BOR - PUMP STATION	$14,890	$3,887	$0										
V		8815	BOR - TELEMETRY	$0	$7,355	$0										
V		8910	MISC. EXPENSE	$0	$510	$470	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500
V		9030	EMERG. FUND (BUREAU CONTR. REQ)			$40,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
V		9040	SAVINGS RECOVERY FUND			$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$30,000	$30,000	$30,000	$30,000	$30,000
TOTAL VARIABLE EXPENSES				$635,583	$538,420	$789,837	$421,000	$430,285	$440,021	$400,230	$410,936	$273,186	$281,130	$289,456	$298,183	$307,329
TOTAL EXPENSES (NON-SALARY)				$844,411	$770,750	$1,028,998	$697,576	$719,402	$725,879	$698,677	$702,041	$578,014	$602,746	$629,211	$657,547	$687,905
TOTAL EXPENSES - SALARY (5% INCREASE/YR AFTER FY00)				$474,655	$482,678	$502,076	$527,180	$553,539	$581,216	$610,277	$640,790	$672,830	$706,471	$741,795	$778,885	$817,829
TOTAL EXPENSES				$1,319,066	$1,253,428	$1,531,074	$1,224,756	$1,272,940	$1,307,095	$1,308,953	$1,342,832	$1,250,843	$1,309,217	$1,371,005	$1,436,432	$1,505,734
				98 EXPENSE	99 EXPENSE	00 BUDGET	01 BUDGET	02 BUDGET	03 BUDGET	04 BUDGET	05 BUDGET	06 BUDGET	07 BUDGET	08 BUDGET	09 BUDGET	10 BUDGET
			YEARLY PERCENTAGE INCREASE		-4.98%	22.15%	-20.01%	3.93%	2.68%	0.14%	2.59%	-6.85%	4.67%	4.72%	4.77%	4.82%

GRANTS PASS IRRIGATION DISTRICT

PROJECTED ASSESSMENT RATES

17-Nov-00

		RATE		TOTAL
		OPERATION & MAINT	BUREAU REPAYMT	
ASSESSMENT LEVY:				
ACCOUNTS	7706	$40.50		$312,093
WATER RIGHT UNIT*	10750	$70.00	$3.50	$790,125
NON-WATER RIGHT UNIT*	3250		$3.50	$11,375
OTHER INCOME:				
REIMBURSED U.G.B.A.				$25,000
INTEREST ON CHARGES				$5,000
INTEREST ON INVESTMENTS				$20,000
OTHER INCOME (SEE BELOW)				$50,777
TOTAL ESTIMATED INCOME				**$1,214,370**

ESTIMATED OTHER INCOME:

RENT: DAM HOUSE	$2,977	$2,977
RENT: SIGNS	$600	$600
BOR COST SHARE FUNDS	$25,000	$0
REIMBURSED LABOR & MATERIALS	$5,000	$5,000
ADMIN FEES: EXCLUSIONS	$10,200	$10,200
DRAINAGE FEES	$0.00	$2,000.00
DEFERRED INCOME	$30,000	$30,000
TOTAL ESTIMATED OTHER INCOME	**$73,777**	**$50,777**

ASSESSMENT RATES BY YEAR

FY2001

ASSESSMENT LEVY:		OPERATION & MAINT	BUREAU REPAYMT		RATES	**PROJECTED PUMP ELCTRICAL COSTS**					
						$50,000	**$75,000**	**$100,000**	**$200,000**	**$300,000**	**$400,000**
ACCOUNTS	7706	$40.50		$312,093							
WATER RIGHT UNIT*	10750	$71.00	$3.50	$800,875	**$115.00**	**$119.75**	**$122.00**	**$124.25**	**$133.75**	**$143.00**	**$152.25**
NON-WATER RIGHT UNIT*	3250		$3.50	$11,375	**$44.00**	**$44.00**	**$44.00**	**$44.00**	**$44.00**	**$44.00**	**$44.00**
TOTAL ESTIMATED OTHER INCOME				$100,777		$100,777	$100,777	$100,777	$100,777	$100,777	$100,777
TOTAL ESTIMATED INCOME				$1,225,120		$1,276,183	$1,300,370	$1,324,558	$1,426,683	$1,526,120	$1,625,558
TOTAL ESTIMATED EXPENDUTURES				$1,224,756		$1,274,756	$1,299,756	$1,324,756	$1,424,756	$1,524,756	$1,624,756
NET REVENUE OVER EXPENSES				**$364**		**$1,427**	**$614**	**($198)**	**$1,927**	**$1,364**	**$802**

FY2002

ASSESSMENT LEVY:		OPERATION & MAINT	BUREAU REPAYMT		RATES	$50,000	$75,000	$100,000	$200,000	$300,000	$400,000
ACCOUNTS	7706	$40.50		$312,093							
WATER RIGHT UNIT*	10750	$75.50	$3.50	$849,250	$119.50	$124.25	$126.50	$128.75	$138.25	$147.50	$156.75
NON-WATER RIGHT UNIT*	3250		$3.50	$11,375	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00
TOTAL ESTIMATED OTHER INCOME				$100,777		$100,777	$100,777	$100,777	$100,777	$100,777	$100,777
TOTAL ESTIMATED INCOME				$1,273,495		$1,324,558	$1,348,745	$1,372,933	$1,475,058	$1,574,495	$1,673,933
TOTAL ESTIMATED EXPENDUTURES				$1,272,940		$1,322,940	$1,347,940	$1,372,940	$1,472,940	$1,572,940	$1,672,940
NET REVENUE OVER EXPENSES				$555		$1,618	$805	($7)	$2,118	$1,555	$993

FY2003

ASSESSMENT LEVY:		OPERATION & MAINT	BUREAU REPAYMT		RATES	$50,000	$75,000	$100,000	$200,000	$300,000	$400,000
ACCOUNTS	7706	$40.50		$312,093							
WATER RIGHT UNIT*	10750	$78.75	$3.50	$884,188	$122.75	$127.25	$129.75	$132.00	$141.25	$150.50	$160.00
NON-WATER RIGHT UNIT*	3250		$3.50	$11,375	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00
TOTAL ESTIMATED OTHER INCOME				$100,777		$100,777	$100,777	$100,777	$100,777	$100,777	$100,777
TOTAL ESTIMATED INCOME				$1,308,433		$1,356,808	$1,383,683	$1,407,870	$1,507,308	$1,606,745	$1,708,870
TOTAL ESTIMATED EXPENDUTURES				$1,307,095		$1,357,095	$1,382,095	$1,407,095	$1,507,095	$1,607,095	$1,707,095
NET REVENUE OVER EXPENSES				$1,338		($287)	$1,588	$775	$213	($350)	$1,775

FY2004

ASSESSMENT LEVY:		OPERATION & MAINT	BUREAU REPAYMT		RATES	$50,000	$75,000	$100,000	$200,000	$300,000	$400,000
ACCOUNTS	7706	$40.50		$312,093							
WATER RIGHT UNIT*	10750	$79.00	$3.50	$886,875	$123.00	$127.50	$129.75	$132.25	$141.50	$150.75	$160.00
NON-WATER RIGHT UNIT*	3250		$3.50	$11,375	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00
TOTAL ESTIMATED OTHER INCOME				$100,777		$100,777	$100,777	$100,777	$100,777	$100,777	$100,777
TOTAL ESTIMATED INCOME				$1,311,120		$1,359,495	$1,383,683	$1,410,558	$1,509,995	$1,609,433	$1,708,870
TOTAL ESTIMATED EXPENDUTURES				$1,308,953		$1,358,953	$1,383,953	$1,408,953	$1,508,953	$1,608,953	$1,708,953
NET REVENUE OVER EXPENSES				**$2,167**		**$542**	**($270)**	**$1,605**	**$1,042**	**$480**	**($83)**

FY2005

ASSESSMENT LEVY:		OPERATION & MAINT	TURBINE LOAN REPAYMT		RATES	$50,000	$75,000	$100,000	$200,000	$300,000	$400,000
ACCOUNTS	7706	$40.50		$312,093							
WATER RIGHT UNIT*	10750	$82.00	$3.50	$919,125	$126.00	$86.75	$133.00	$135.25	$144.75	$154.00	$163.25
NON-WATER RIGHT UNIT*	3250		$3.50	$11,375	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00
TOTAL ESTIMATED OTHER INCOME				$100,777		$100,777	$100,777	$100,777	$100,777	$100,777	$100,777
TOTAL ESTIMATED INCOME				$1,343,370		$1,394,433	$1,418,620	$1,442,808	$1,544,933	$1,644,370	$1,743,808
TOTAL ESTIMATED EXPENDUTURES				$1,342,832		$1,392,832	$1,417,832	$1,442,832	$1,542,832	$1,642,832	$1,742,832
NET REVENUE OVER EXPENSES				**$538**		**$1,601**	**$788**	**($24)**	**$2,101**	**$1,538**	**$976**

ASSESSMENT RATES BY YEAR

FY2006

						PROJECTED PUMP ELCTRICAL COSTS					
ASSESSMENT LEVY:		OPERATION & MAINT	BUREAU REPAYMT		RATES	**$50,000**	**$75,000**	**$100,000**	**$200,000**	**$300,000**	**$400,000**
ACCOUNTS	7706	$40.50		$312,093							
WATER RIGHT UNIT*	10750	$73.50	$3.50	$827,750	**$117.50**	**$122.25**	**$124.50**	**$126.75**	**$136.00**	**$145.50**	**$154.75**
NON-WATER RIGHT UNIT*	3250		$3.50	$11,375	**$44.00**	**$44.00**	**$44.00**	**$44.00**	**$44.00**	**$44.00**	**$44.00**
TOTAL ESTIMATED OTHER INCOME				$100,777		$100,777	$100,777	$100,777	$100,777	$100,777	$100,777
TOTAL ESTIMATED INCOME				$1,251,995		$1,303,058	$1,327,245	$1,351,433	$1,450,870	$1,552,995	$1,652,433
TOTAL ESTIMATED EXPENDUTURES				$1,250,843		$1,300,843	$1,325,843	$1,350,843	$1,450,843	$1,550,843	$1,650,843
NET REVENUE OVER EXPENSES				**$1,152**		**$2,215**	**$1,402**	**$590**	**$27**	**$2,152**	**$1,590**

FY2007

ASSESSMENT LEVY:		OPERATION & MAINT	BUREAU REPAYMT		RATES	**$50,000**	**$75,000**	**$100,000**	**$200,000**	**$300,000**	**$400,000**
ACCOUNTS	7706	$40.50		$312,093							
WATER RIGHT UNIT*	10750	$79.00	$3.50	$886,875	**$123.00**	**$127.50**	**$130.00**	**$132.25**	**$141.50**	**$150.75**	**$160.25**
NON-WATER RIGHT UNIT*	3250		$3.50	$11,375	**$44.00**	**$44.00**	**$44.00**	**$44.00**	**$44.00**	**$44.00**	**$44.00**
TOTAL ESTIMATED OTHER INCOME				$100,777		$100,777	$100,777	$100,777	$100,777	$100,777	$100,777
TOTAL ESTIMATED INCOME				$1,311,120		$1,359,495	$1,386,370	$1,410,558	$1,509,995	$1,609,433	$1,711,558
TOTAL ESTIMATED EXPENDUTURES				$1,309,217		$1,359,217	$1,384,217	$1,409,217	$1,509,217	$1,609,217	$1,709,217
NET REVENUE OVER EXPENSES				**$1,903**		**$278**	**$2,153**	**$1,341**	**$778**	**$216**	**$2,341**

FY2008

ASSESSMENT LEVY:		OPERATION & MAINT	BUREAU REPAYMT		RATES	$50,000	$75,000	$100,000	$200,000	$300,000	$400,000
ACCOUNTS	7706	$40.50		$312,093							
WATER RIGHT UNIT*	10750	$84.75	$3.50	$948,688	$128.75	$133.25	$135.75	$138.00	$147.25	$156.50	$166.00
NON-WATER RIGHT UNIT*	3250		$3.50	$11,375	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00
TOTAL ESTIMATED OTHER INCOME				$100,777		$100,777	$100,777	$100,777	$100,777	$100,777	$100,777
TOTAL ESTIMATED INCOME				$1,372,933		$1,421,308	$1,448,183	$1,472,370	$1,571,808	$1,671,245	$1,773,370
TOTAL ESTIMATED EXPENDUTURES				$1,371,005		$1,421,005	$1,446,005	$1,471,005	$1,571,005	$1,671,005	$1,771,005
NET REVENUE OVER EXPENSES				**$1,927**		**$303**	**$2,178**	**$1,365**	**$803**	**$240**	**$2,365**

FY2009

ASSESSMENT LEVY:		OPERATION & MAINT	BUREAU REPAYMT		RATES	$50,000	$75,000	$100,000	$200,000	$300,000	$400,000
ACCOUNTS	7706	$40.50		$312,093							
WATER RIGHT UNIT*	10750	$90.75	$3.50	$1,013,188	$134.75	$139.50	$141.75	$144.00	$153.25	$162.75	$172.00
NON-WATER RIGHT UNIT*	3250		$3.50	$11,375	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00
TOTAL ESTIMATED OTHER INCOME				$100,777		$100,777	$100,777	$100,777	$100,777	$100,777	$100,777
TOTAL ESTIMATED INCOME				$1,437,433		$1,488,495	$1,512,683	$1,536,870	$1,636,308	$1,738,433	$1,837,870
TOTAL ESTIMATED EXPENDUTURES				$1,436,432		$1,486,432	$1,511,432	$1,536,432	$1,636,432	$1,736,432	$1,836,432
NET REVENUE OVER EXPENSES				**$1,001**		**$2,063**	**$1,251**	**$438**	**($124)**	**$2,001**	**$1,438**

FY2010											
ASSESSMENT LEVY:		OPERATION & MAINT	TURBINE LOAN REPAYMT		RATES	$50,000	$75,000	$100,000	$200,000	$300,000	$400,000
ACCOUNTS	7706	$40.50		$312,093							
WATER RIGHT UNIT*	10750	$97.25	$3.50	$1,083,063	$141.25	$145.75	$148.25	$150.50	$159.75	$169.00	$178.50
NON-WATER RIGHT UNIT*	3250		$3.50	$11,375	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00
TOTAL ESTIMATED OTHER INCOME				$100,777		$100,777	$100,777	$100,777	$100,777	$100,777	$100,777
TOTAL ESTIMATED INCOME				$1,507,308		$1,555,683	$1,582,558	$1,606,745	$1,706,183	$1,805,620	$1,907,745
TOTAL ESTIMATED EXPENDUTURES				$1,505,734		$1,555,734	$1,580,734	$1,605,734	$1,705,734	$1,805,734	$1,905,734
NET REVENUE OVER EXPENSES				**$1,574**		**($51)**	**$1,824**	**$1,011**	**$449**	**($114)**	**$2,011**

Grants Pass Irrigation District

Irrigation Rates

Year	Account Charge	Water Right Charge	Bureau Contract	Rehab & Constr.	Re-lift Pump Charge	Total Charge	Total Non-water Right Charge
1974		11.90	1.99	3.11		17.00	
1975		17.00	1.50	3.50		22.00	
1976		16.85	2.20	2.95		22.00	
1977		17.75	1.63	2.62		22.00	
1978		19.39	1.61	3.00		24.00	
1979		17.65	1.40	4.95		24.00	
1980		24.28	2.44	.28		27.00	
1981		25.24	1.49	.27		27.00	
1982		29.27	1.26	1.47		32.00	
1983		30.24	1.44	.32		32.00	
1984		31.92	1.50	.58		34.00	
1985		31.67	1.78	.55		34.00	
1986		31.76	1.87	.37		34.00	
1987		34.00	2.00	0.00		36.00	
1988		34.00	2.00	0.00		36.00	
1989		34.00	2.00	0.00		36.00	
1990		34.00	2.00	0.00		36.00	
1991	25.00	34.00	2.00	0.00		61.00	
1992	25.00	38.00	2.00	0.00	25.00	90.00	27.00
1993	37.00	43.00	2.00	0.00	0.00	82.00	39.00
1994	37.00	43.00	2.00	0.00	0.00	82.00	39.00
1995	37.00	43.00	2.00	0.00	0.00	82.00	39.00
1996	37.00	43.00	2.00	0.00	0.00	82.00	39.00
1997	37.00	43.00	2.00	0.00	0.00	82.00	39.00
1998	39.00	55.00	2.00	0.00	0.00	96.00	41.00
1999	40.50	71.00	3.50	0.00	0.00	115.00	44.00
2000	40.50	70.00	3.50	0.00	0.00	114.00	44.00
2001	40.50	69.00	3.50	0.00	0.00	113.00	44.00